User Manual

Allen-Bradley

DeviceNet Network Configuration

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	ATTENTION: Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss. Attentions help you identify a hazard, avoid a hazard, and recognize the consequence
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This manual contains new and updated information. Changes throughout this revision are marked by change bars, as shown to the right of this paragraph.

New and Updated Information

This table contains the changes made to this revision.

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Notes:

This manual describes how you can use DeviceNet modules with your Logix5000 controller and communicate with various devices on the DeviceNet network.

You should use this manual if you program applications that use DeviceNet with one of these Logix5000 controllers:

- 1756 ControlLogix controllers
- 1768 CompactLogix controllers
- 1769 CompactLogix controllers
- 1789 SoftLogix 5800 controllers
- PowerFlex 700S with DriveLogix controllers

You should also understand the following:

- Networking concepts
- RSNetWorx for DeviceNet software
- RSLogix 5000 programming software
- RSLinx Classic communication software

Additional Resources

For more information on the products included in this publication, use the publications listed in this table.

Resource	Description
DeviceNet Modules Installation Instructions, publication DNET-IN001	Describes how to install and set up 1756-DNB, 1769-ADN, and 1769-SDN DeviceNet modules.
DeviceNet Media Design Installation Guide, publication DNET-UM072	Describes how to design, install, and troubleshoot a DeviceNet cable system.
Logix5000 Controllers Common Procedures Programming Manual, publication 1756-PM001M	Links to a collection of programming manuals that describe how you can use procedures that are common to all Logix5000 controller projects.

Network Configuration

The following chapters describe how to set up a DeviceNet network:

- Chapter 2—Connect a Computer to the DeviceNet Network
- Chapter 3—Connect Devices to the Network
- Chapter 4—Configure the Network Offline
- Chapter 5—Configure the Network Online

You **are not required to** complete all tasks in each chapter in the **exact order** presented to set up your DeviceNet application. For example, you can configure your network offline before you connect a computer to the network.

However, there are **some requirements** related to the order in which you complete tasks. For example, you must complete the tasks in chapters 2 and 3 before you can configure the network online.

The following table describes optional and required conditions to consider when determining the order in which you plan to complete tasks in your DeviceNet application.

Network Configuration Tasks

Task	Optional Conditions	Required Conditions
Connect a computer to the network	• Can be completed before or after connecting devices to the network • Can be completed before or after configuring the network **offline**	Must be completed before configuring the network **online**
Connect devices to the network	• Can be completed before or after connecting a computer to the network • Can be completed before or after configuring the network **offline**	Must be completed before configuring the network **online**
Configure the network offline	• Can be completed before or after connecting a computer to the network • Can be completed before or after connecting devices to the network • Can be completed before configuring the network online	None
Configure the network online	Can be completed without creating a network configuration file offline	• Computer must be connected to the network before configuring the network online • Devices must be connected to the network before configuring the network online

DeviceNet Overview

The Logix5000 family of controllers operates with many DeviceNet communication modules. This chapter describes each communication module and the preliminary tasks you must complete before your configure and program the DeviceNet network.

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DeviceNet communication modules share these features:

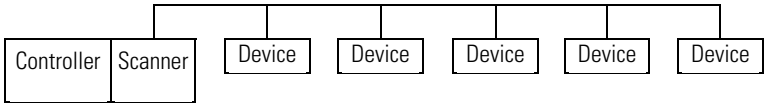
- Interface via cabling systems using either round or flat media that provide both power and communication
- Use network protocols
- Require no network scheduling
- Support messaging, produced/consumed data, and distributed I/O

Choose a Single Network or Subnets

You can organize the devices on the network in a single network or several, smaller distributed networks known as subnets.

Single Network

When you use a single network, you place all your devices on a single DeviceNet network and connect the controller directly to the network via a scanner. The following graphic shows a single network.



Advantages to Using a Single Network

There are advantages to using a single network for your DeviceNet application:

- The overall cost to install the network is lower than using subnets.
- You need to manage only a single network.
- The Logix5000 controller is local to the DeviceNet scanner. For example, with a single network in a ControlLogix application, the 1756-L64 controller is in the same ControlLogix chassis as the 1756-DNB scanner.

Disadvantages to Using a Single Network

There are disadvantages to using a single network for your DeviceNet application:

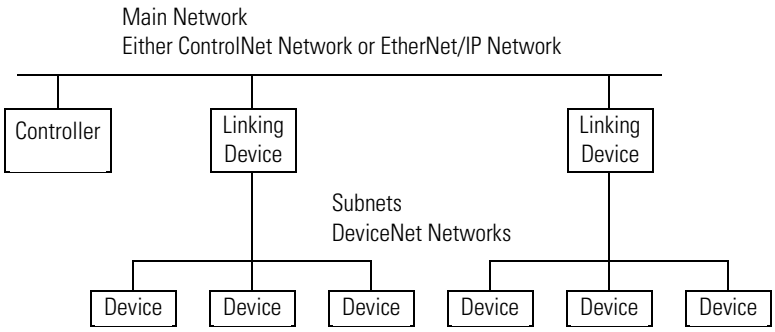
- The network must use shorter distances from one end to another.
- The more devices on the network, the slower the overall performance of the network.
- Your network may have more power supply requirements than can be handled by one network
- A single network can contain only up to 64 nodes

Subnets

A subnet configuration is a main network that is connected to distributed subnets using a scanner, or linking device. In this option, you must install a ControlNet network or EtherNet/IP network, also known as a backbone, that connects to distributed subnets using a linking device.

For example, if you choose an EtherNet/IP network backbone, you must use 1788-EN2DN linking devices to connect the subnets.

The following graphic shows a subnet network.



Advantages to Using Subnets

There are advantages to using subnets for your DeviceNet application:

- Typically, there are shorter runs on subnets, which allow a faster communication rate for the DeviceNet network.
- With fewer devices on each subnet, the overall performance of the network is faster.
- There are simpler power requirements.

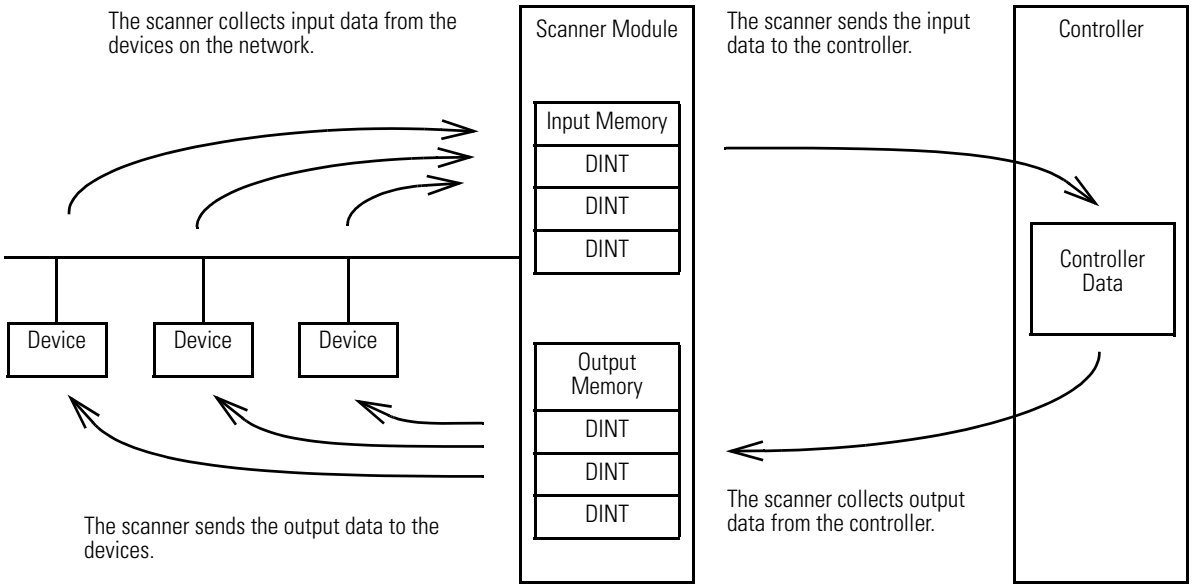
Disadvantages to Using Subnets

There are disadvantages to using subnets for your DeviceNet application:

- The overall cost to install the network is higher than using a single network.
- You must manage multiple networks.
- The Logix5000 controller is remote from the linking device. For example, with subnets in a 1768 CompactLogix application, a 1768-L45 controller is remote from the 1788-CN2DN linking device.

Choose a Scanner

The DeviceNet scanner connects a Logix5000 controller to the devices on a DeviceNet network. The following graphic shows how a scanner exchanges data between a controller and devices on the DeviceNet network.



The following table describes how to choose a scanner.

If you are using	And	Use this scanner
Single network	1768 or 1769 CompactLogix controller	CompactLogix 1769-SDN modules
	ControlLogix controller	ControlLogix 1756-DNB modules
	DriveLogix controller	1788-DNBO DeviceNet daughtercard
	SoftLogix 5800 controller	1784-PCIDS card
Subnets	EtherNet/IP main network	EtherNet/IP to DeviceNet Linking Device 1788-EN2DN
	ControlNet main network	ControlNet to DeviceNet Linking Device 1788-CN2DN

Bridge Across Networks

Logix5000 controllers can usually communicate with devices on other networks with no additional configuration or programming. A bridge connects two networks.

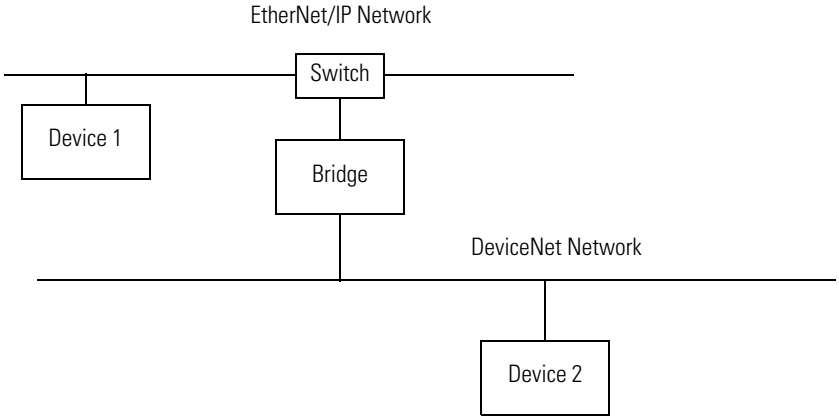
IMPORTANT You cannot bridge from a device on a DeviceNet network to a device on a ControlNet nor EtherNet/IP network. You can only bridge from devices on ControlNet or EtherNet/IP networks to devices on DeviceNet networks.

Refer to table Bridging Across Networks on page 17 for more information.

The bridge is one of the following:

- A single device with communication ports for two different networks, such as a 1788-EN2DN linking device
- A separate communication device in the same chassis

For example, the bridge device shown in the following graphic is connected to both EtherNet/IP and DeviceNet networks. Device 1 on an EtherNet/IP network can communicate with Device 2 on a DeviceNet network through the bridge.



The following table describes how communication can bridge the networks.

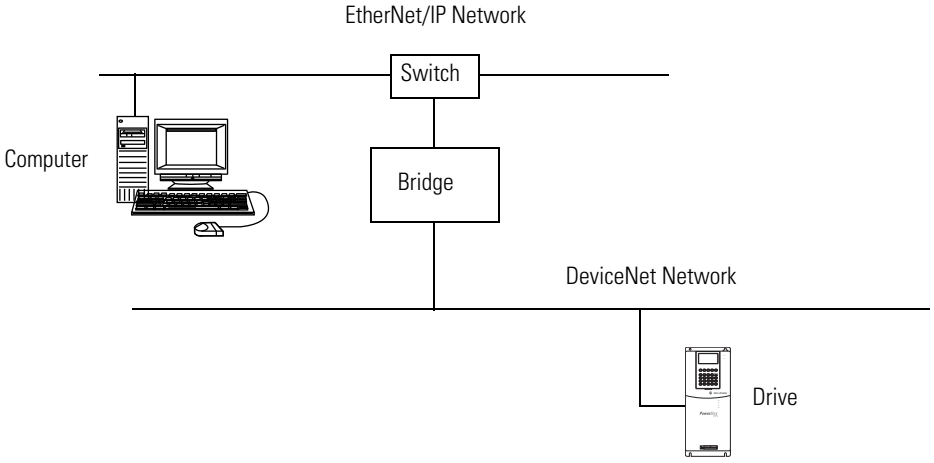
Bridging Across Networks

A device on this network	Can access a device on this network			
	EtherNet/IP	**ControlNet**	**DeviceNet**	**RS-232[2]**
EtherNet/IP	yes	yes	yes	yes
ControlNet	yes	yes	yes	yes
DeviceNet	no	no	yes	no
RS-232	yes	yes[1]	yes	yes

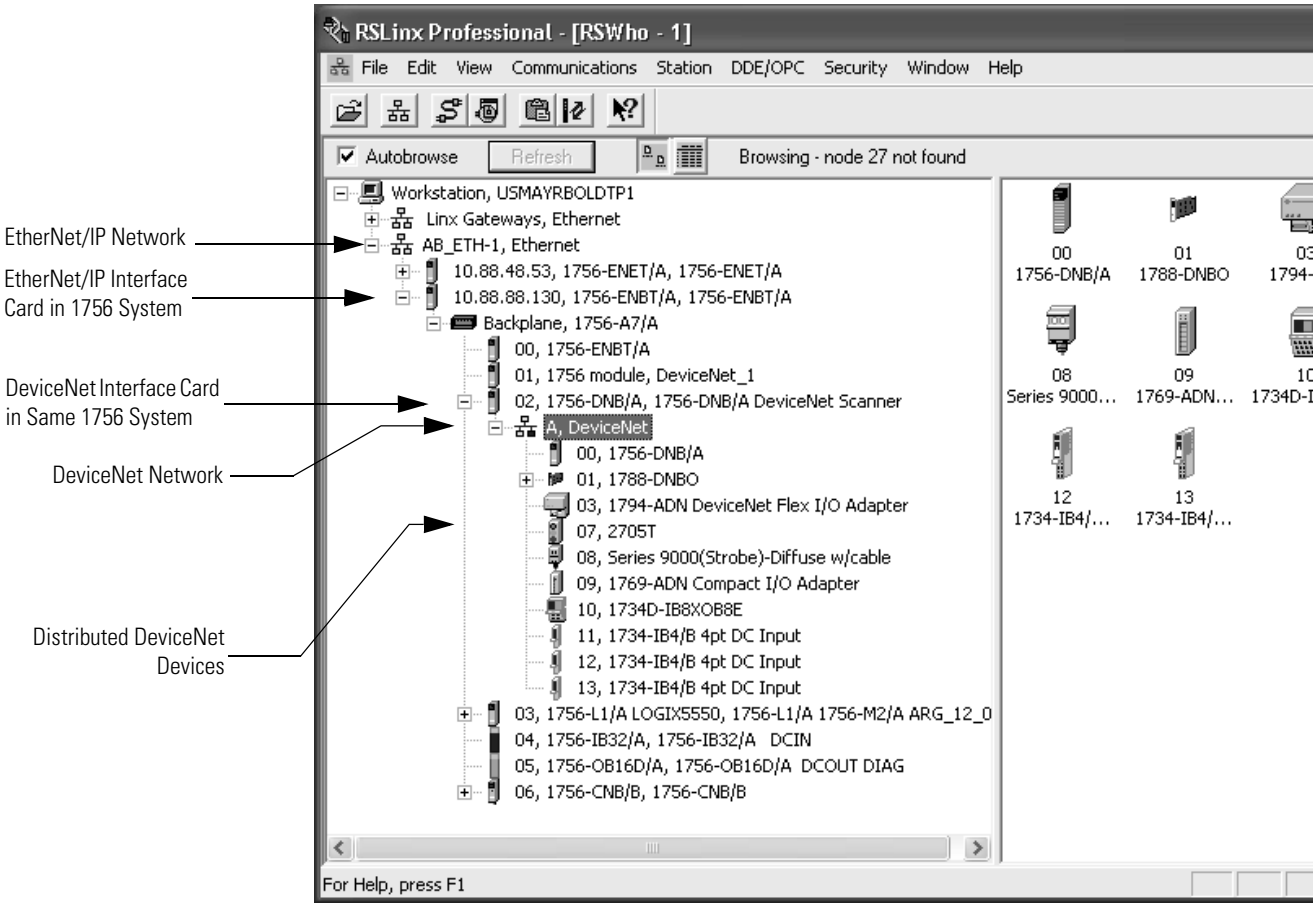
(1) To use RSNetWorx for ControlNet software to configure and schedule a ControlNet network, we recommend that you complete one of the following tasks.
- Connect to an EtherNet/IP network and bridge to the ControlNet network.
- Use a 1784-U2CN interface device to connect directly to the ControlNet network.

(2) Typically, this is a point-to-point connection between a Logix5000 controller and another device, such as a PanelView Plus operator terminal.

In this example, a computer configures a drive on a DeviceNet network. The workstation bridges an EtherNet/IP network to reach the drive.



In this example, the RSLinx communication software window shows how the DeviceNet bridge links to the EtherNet/IP network.



Choose a Baud Rate for the Network

You must choose a baud rate for the DeviceNet network. There are three rates available for the network:

- 125 kbps—This is the default baud rate for a DeviceNet network. It is the easiest baud rate to use and is usually sufficient.
- 250 kbps
- 500 kbps

The following table describes the most common methods to set a baud rate.

Method	Description
Autobaud feature	At powerup, the device automatically sets its baud rate to the baud rate of the first device it hears on the network. The baud rate remains set until the device powers up again. The network requires at least one device with a fixed baud rate so the autobaud devices have something against which to set. Typically, scanners and network interfaces have a fixed baud rate.
Switches or push button on the device	Some devices have switches or push buttons that set the baud rate as follows: • The device reads the switch setting at powerup. • Typically, the switch lets you select either autobaud or a fixed baud rate, that is 125 Kbps, 250 Kbps, or 500 Kbps • If you change the switch setting, you must cycle power to the device before the change takes effect. There are exceptions. For example, the 1756-DNB module has a push button that only lets you set the baud rate if the module is disconnected from the network or network power is off. Once you change the baud rate, the module automatically resets to the new baud rate.
Software	Some devices require a programming device to set its address. For example, you can use the computer and the DeviceNet node commissioning tool to set the baud rate of a device. The node commissioning tool is available in either of the following methods: • Automatically when you install RSNetWorx for DeviceNet software • As a separate application on the RSLogix 5000 programming software CD, revision 13.0 or later

The length of the trunkline and type of cable determines which baud rates you can use.

Baud Rate	Maximum Distance			Cumulative Drop Line Length
	Flat Cable	Thick Cable	Thin Cable	
125K bit/s	420m (1378 ft)	500m (1640 ft)	100m (328 ft)	156 m (512 ft)
250K bit/s	200m (656 ft)	250m (820 ft)	100m (328 ft)	78m (256 ft)
500K bit/s	75m (246 ft)	100m (328 ft)	100m (328 ft)	39m (128 ft)

If you change the baud rate of the network, make sure that all devices change to the new baud rate. Mixed baud rates produce communication errors.

Complete the following steps to set the baud rate for the network.

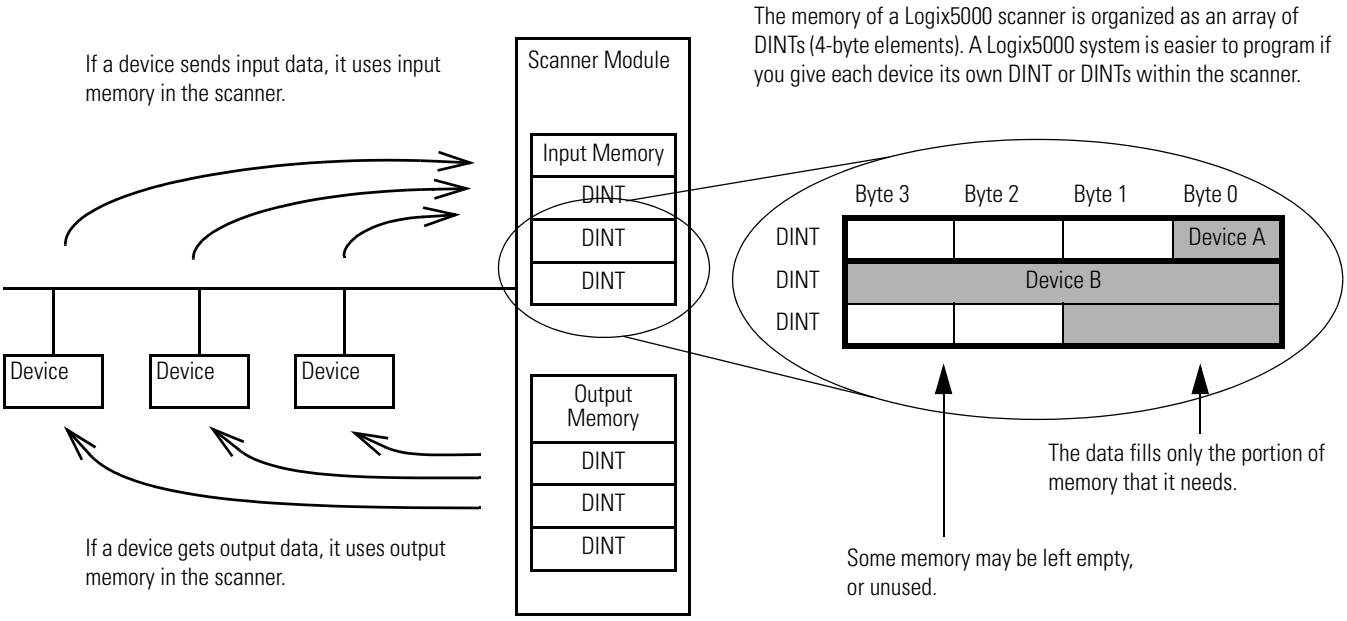
1. Connect the network interface to the network and set its baud rate.
2. Connect the scanner to the network and set its baud rate.
3. For each device that has **only** fixed baud rates (**no** autobaud), set the baud rate and connect it to the network.

4. Connect the remaining devices to the network and enable autobaud for each of them.

If a device	Then
has a switch to enable autobaud	1. Set the switch to autobaud. 2. Connect the device to the network.
does **not** have a switch to enable autobaud	1. Connect the device to the network. 2. Use RSNetWorx for DeviceNet software to enable autobaud.

Calculate Scanner Memory Requirements

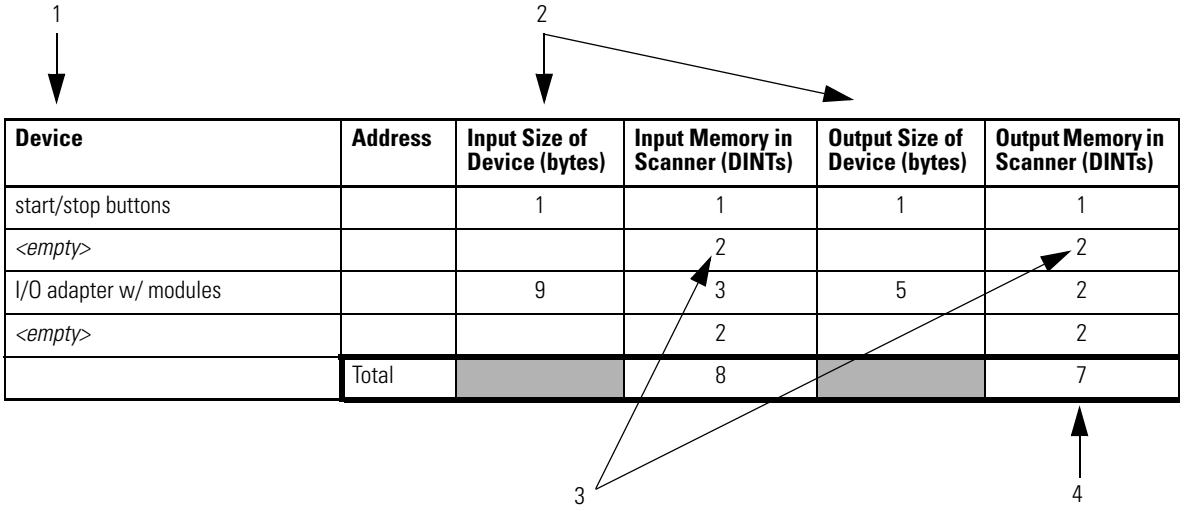
A Logix5000 scanner has fixed sections of memory for the network's input and output data. Each device on the network requires either scanner input or output memory. Devices that send and receive data need both input and output memory.



To make sure the network is within limits, calculate the amount of input and output memory that the scanner needs. This information is useful when you configure the scanner.

Complete the following steps to calculate how much scanner memory you need.

1. List the devices on the network.
2. Record how many bytes each device sends to your control system as input data and gets from your control system as output data.
3. Convert the input and output sizes to DINTs where DINTs = (bytes/4) rounded up to an integer.
4. Determine the total memory that you need in your scanner.



Device	Address	Input Size of Device (bytes)	Input Memory in Scanner (DINTs)	Output Size of Device (bytes)	Output Memory in Scanner (DINTs)
start/stop buttons		1	1	1	1
<empty>			2		2
I/O adapter w/ modules		9	3	5	2
<empty>			2		2
	Total		8		7

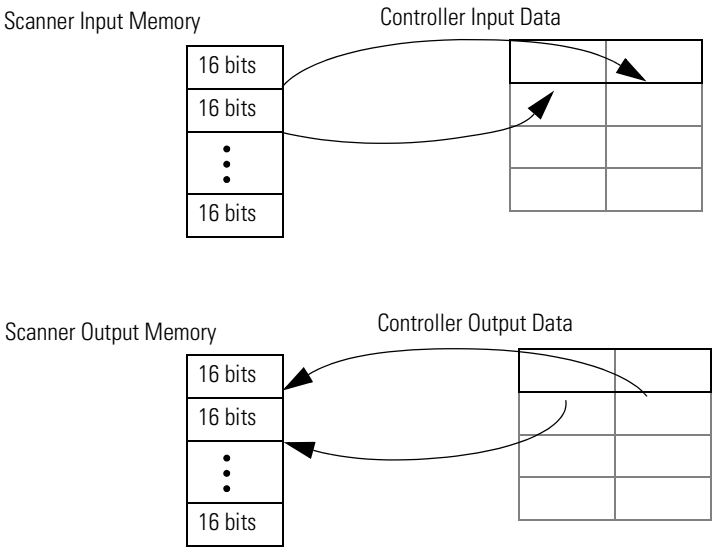
Check the I/O Limits of the Scanner

Once you tally the input and output data for the network, make sure it is within the limits of the scanner. If they exceed the limits, use multiple scanners.

Scanner	Maximum input data (DINTs)	Maximum output data (DINTs)
1756-DNB	124	123
1769-SDN	90	90
1788-CN2DN	124	123
1788-EN2DN	124	123
1788-DNBO	124	123

When Using a SoftLogix 5800 Controller

The 1784-PCIDS universal PCI scanner card organizes its input and output memory in 16-bit increments. When you access the data in the controller, the data is packed into 32-bit increments (DINTs). This means that two 16-bit scanner data locations will fit into a single 32-bit controller data location.



A Logix5000 system is easier to program if you give each device its own DINT or DINTs within the controller. To accomplish this with a 1784-PCIDS scanner, allocate memory in 4-byte increments. This may result in some 16-bit words being left unused.

Assign an Address to Each Device

To communicate on the DeviceNet network, each device requires its own address. In general, a device can use any address in the range of 0...63. However, we recommend that you follow the guidelines in the following table.

Give this device	This address	Notes
Scanner	0	If you have multiple scanners, give them the lowest addresses in sequence (0, 1…).
Any device on the network except the scanner	1…61	• Give the lower addresses to devices with 15 bytes or more of input or output data. • Gaps between addresses are OK and have no effect on system performance. If you are uncertain of the final lay-out of your system, leave gaps between addresses. This gives you some flexibility as you develop your system.
Computer interface to the network	62	If you connect a computer directly to the DeviceNet network, use address 62 for the computer. • Many computer interface devices use this address as their default. • The 1784-U2DN device can connect a computer directly to a DeviceNet network.
No device	63	Always leave address 63 open. Out of the box, most DeviceNet devices are preset for address 63. • Some devices have no switches or push button to set the address. They require software, such as RSNetWorx for DeviceNet software to change the address. This means that you must first place it on the network at its preset address of 63 before you can change the address. • If another device is already using address 63, there will be an address conflict and you won't be able to communicate with the newly connected device. • Leaving address 63 open makes it possible to configure a new device. • The auto-address recovery feature also requires address 63 to be open.

Refer to Chapter 3 on page 29 for more information on how to assign an address to each device.

Required Software

You must use the correct software with the DeviceNet application.

- To connect your computer to the DeviceNet network, use RSLinx communication software.
- To program the Logix5000 controller, use RSLogix 5000 programming software.
- To the configure the DeviceNet network, use RSNetWorx for DeviceNet software.

Notes:

Connect a Computer to the DeviceNet Network

This chapter shows how to connect a computer to the network. After you physically connect a computer to the network, you must configure a driver in RSLinx communication software to communicate over the network.

Topic	Page
Connection Options	26
Set Up the DeviceNet Driver	27

After you connect a computer to the network and configure a driver in RSLinx communication software, you can complete these tasks:

- Configure the devices on the network
- Configure network parameters
- Upload, download, monitor, and program projects for Logix5000 controllers

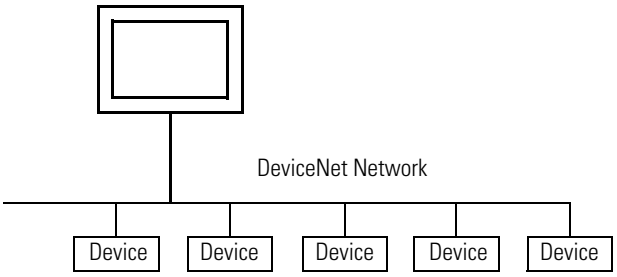
Some networks let you bridge to other networks in your system. This lets you connect to one network and access devices or controllers on other networks.

Connection Options

To access the DeviceNet network, do one of the following:

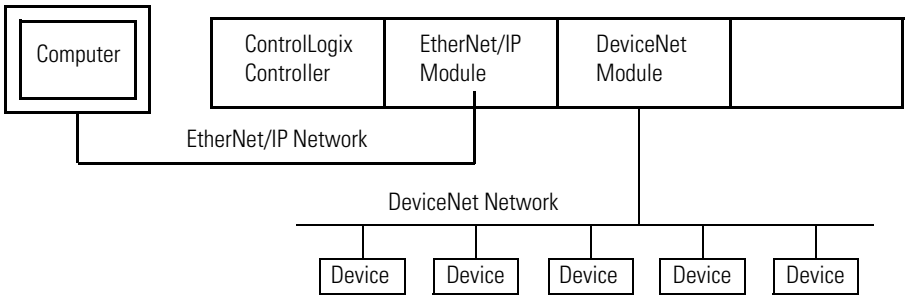
- Connect directly to the network via the 1784-U2DN interface device. If you connect directly to a DeviceNet network, you can access only the devices on that network. If you use this method, refer to Set Up the DeviceNet Driver on page 27.

  The following graphic shows a computer connected directly to a DeviceNet network.



- Connect to a different network and bridge to the desired DeviceNet network. This requires **no** additional programming.

  The following graphic shows a computer connected to a DeviceNet network through an EtherNet/IP network used with a ControlLogix system.



For more information about installing modules on the DeviceNet network, refer to the Rockwell Automation Literature Library at the following address:

http://www.rockwellautomation.com/literature/

To find the installation publications specific to your module, search by the module's catalog number.

Set Up the DeviceNet Driver

The requirements for setting up the DeviceNet driver depend on your version of RSLinx Classic software.

RSLinx Classic Software Version	Action
2.50 or earlier	Upgrade to version 2.51 or later to use the 1784-U2DN interface device.
2.51, 2.52, or 2.53	Proceed to Obtain the Driver for the Interface Device on page 27.
2.54 or later	The 1784-U2DN interface device driver is already installed on the computer. Proceed to Verify that the Driver Works on page 27.

Obtain the Driver for the Interface Device

Follow these steps to download and install the device driver for the 1784-U2DN interface device.

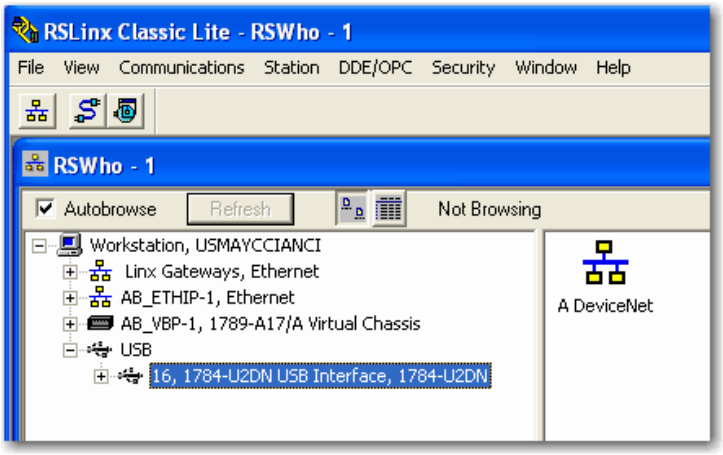
1. Visit http://www.rockwellautomation.com/knowledgebase/.

2. Open tech note ID 53280 and follow the instructions to install the driver.

Verify that the Driver Works

Complete the following steps to verify that the driver for the 1784-U2DN interface device works.

1. Open RSLinx Classic software.
2. Click the Browse button and verify that the 1784-U2DN interface appears under USB.



Notes:

Connect Devices to the Network

This chapter describes how to connect a device to the network and set the device's address so it can communicate on the DeviceNet network.

Topic	Page
Before You Begin	29
Set the Node Address of a Device	30
Make Sure Your Devices Are on Your Network	36

Before You Begin

Be sure that all communication modules have been installed. Also, have a list of the devices that you are putting on the network and an address for each of them. The following table shows an example list of devices.

Device	Address	Input Size of Device (bytes)	Input Memory in Scanner (DINTs)	Output Size of Device (bytes)	Output Memory in Scanner (DINTs)
scanner	0	n/a	n/a	n/a	n/a
PanelView terminal	3	128	32	128	32
<empty>			2		2
I/O adapter w/ modules	5	9	3	5	2
<empty>			2		2
drive	7	4	1	4	1
<empty>			2		2
photoeye	9	1	1	0	0
computer interface	62	n/a	n/a	n/a	n/a
	63				
	Total		43		41

Set the Node Address of a Device

You can use the following options to set the node address of DeviceNet devices. However, not all options apply to every DeviceNet device.

For example, you can use all three options with the 1756-DNB ControlLogix DeviceNet scanner, but you can use only the second and third methods with the 1769-SDN Compact I/O DeviceNet scanner.

- Set Node Address via Hardware Mechanism
- Set Node Address via Software
- Set Node Address via DeviceNet Node Commissioning Tool

All DeviceNet devices ship with their node addresses set to 63. To avoid duplicate node number conditions on the network, you should change the node address for each device to a unique number as you add it to the network.

Give this address	To this device
0	Scanner
1…61	Devices
62	Computer interface to the network, such as a 1784-U2DN device
63	None Out of the box, a DeviceNet communication module is preset for address 63. Leaving address 63 open lets you get a new device on the network without conflicting with another device.

For more information about setting the node address of DeviceNet devices, refer to the Rockwell Automation Literature Library at the following address:

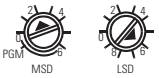
http://www.rockwellautomation.com/literature/

To find the publications specific to your module, search by the module's catalog number.

Set Node Address via Hardware Mechanism

Many DeviceNet devices have a hardware mechanism that you can use to set the node address. If a device has a hardware mechanism to set the node address, use that mechanism.

The following table describes the two most common hardware mechanisms.

Mechanism	Graphic	Description
Rotary switch		You turn the dials of rotary switches to specific numbers that represent the device's node address. You usually need a small flathead screwdriver to turn the switches. A device reads the switches when you power it up. If you change the address, you should cycle power to that device for the change to take effect.
Push-wheel switch		You set the numbers on the push-wheel switch to specific numbers that represent the device's node address.

IMPORTANT As long as a device's hardware mechanism sets the node address to 63 or lower, you cannot change the node address with RSNetWorx for DeviceNet software or the DeviceNet node commissioning tool.

Make sure each device's node address set by a hardware mechanism matches the node address used in your RSNetWorx for DeviceNet software network configuration file, as described on page 40.

However, if you set a device's hardware mechanism to a number **higher than 63**, you can use RSNetWorx for DeviceNet software or the DeviceNet node commissioning tool to set the node address.

IMPORTANT You must cycle power to the module for node changes set through hardware to take effect.

Set Node Address via Software

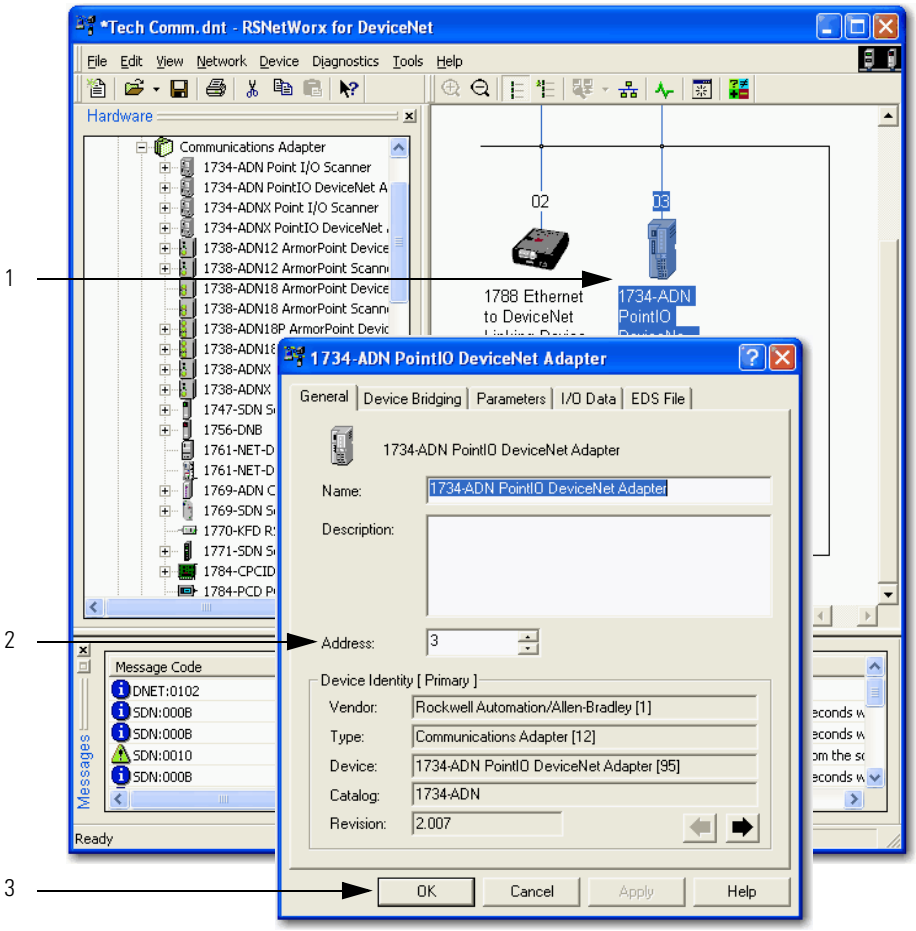
You can set a device's node address in RSNetWorx for DeviceNet software.

IMPORTANT Setting a device's node address is only one task used when configuring a device with RSNetWorx for DeviceNet software.

For complete information on how to configure all parameters with RSNetWorx for DeviceNet software, including setting a device's node address, refer to Chapter 4 on page 37.

Complete the following steps to set a device's node address in your network configuration file. This example uses an AC drive.

1. Double-click the device.
2. Enter the DeviceNet address for the device.
3. Click OK to close the configuration window.



IMPORTANT The node address assigned by RSNetWorx for DeviceNet software only takes effect if the device **does not** have a hardware mechanism to set the node address or if the device has its hardware mechanism set to a number higher than 63.

Set Node Address via DeviceNet Node Commissioning Tool

You can use the DeviceNet node commissioning tool available in RSNetWorx for DeviceNet software to set the node addresses of devices on the DeviceNet network. Remember the following when you decide to use the DeviceNet node commissioning tool.

- You can only use this tool with a DeviceNet network that is online.
- You can only use this tool as you add new devices to the network that either do not have hardware mechanisms to set their node address or have their hardware mechanism set to a number higher than 63.

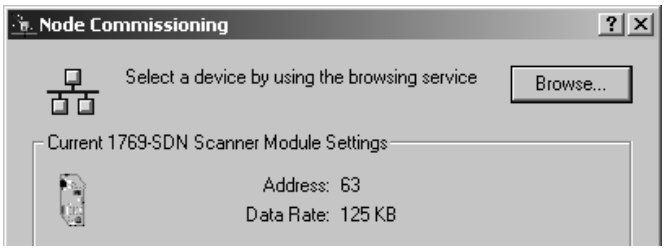
  If you add a device to the network with a hardware mechanism setting the node address to 63 or lower, this tool does not change the device's node address.
- You should complete the tasks described in this section each time a new device is added to the network.
- If you add more than one device to the online network before using the DeviceNet node commissioning tool, you will experience duplicate node address conflicts on the network because all new devices initially use node address 63.
- Keep track of the node addresses you set with the DeviceNet node commissioning tool and verify they match the device's configuration in the RSNetWorx for DeviceNet software configuration file.

Complete the following steps to use the DeviceNet node commissioning tool to set a device's node address. This example uses the 1769-SDN Compact I/O DeviceNet Scanner module.

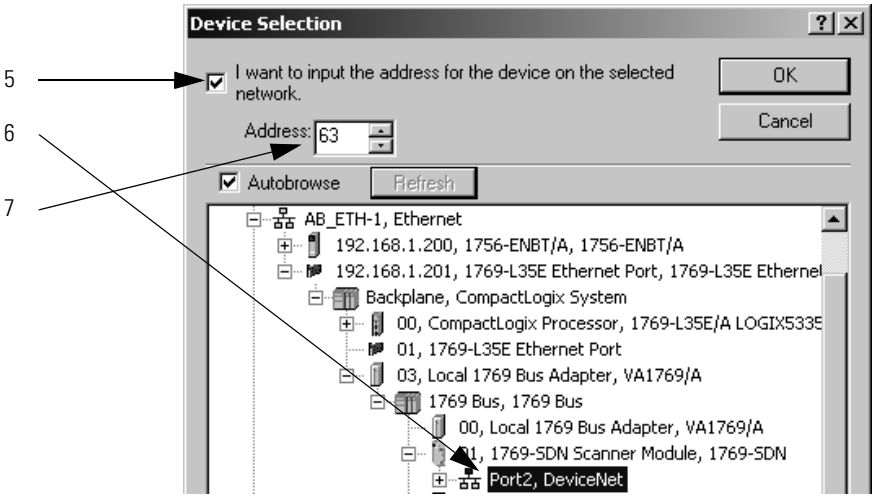
1. Verify that the network is online.
2. Connect a device to the DeviceNet network.
3. Choose Start>Programs>Rockwell Software>RSNetWorx for DeviceNet>DeviceNet node commissioning tool.

   or

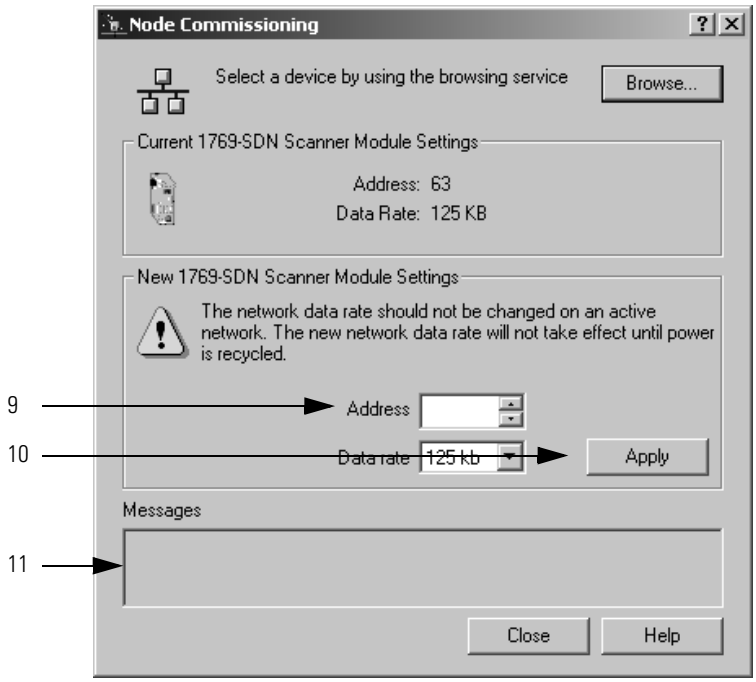
   From the Tools pull-down menu in RSNetWorx for DeviceNet software, choose Node Commissioning.
4. Click Browse.



5. On the Device Selection dialog box, check the 'I want to input the address for the device on the selected network' box.
6. Browse to the DeviceNet network.
7. Type the current address for the device. Out of the box, devices use address 63.
8. Click OK.



9. When you return to the Node Commissioning dialog box, enter the new address for the device.
10. Click Apply.
11. Look for confirmation.

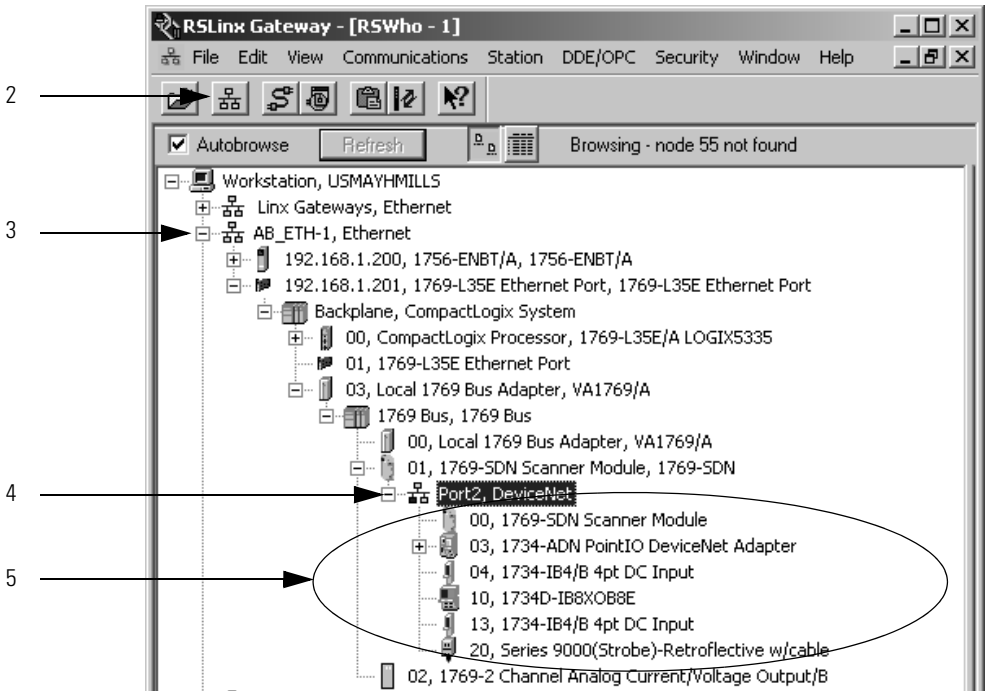


12. If you need to use the DeviceNet node commissioning tool to set another device's node address, return to step 2 on page 34 and repeat the process.

Make Sure Your Devices Are on Your Network

Once you have assigned a node address to each device, make sure that the devices are communicating on the network. Complete these steps to make sure your devices are on the network.

1. Start RSLinx communication software.
2. Go online.
3. Expand a driver that lets you access the DeviceNet network.
4. Browse to the DeviceNet network.
5. Make sure you see all the devices that are connected to the DeviceNet network.



Configure the Network Offline

This chapter describes how to configure the network offline with RSNetWorx for DeviceNet software.

Topic	Page
Before You Begin	38
Create a File for the Network	38
Create Your Network in RSNetWorx for DeviceNet Software	39
Configure Each Device	40
Configure the Scanner	44
Save the Configuration File	51
Generate an RSNetWorx for DeviceNet Report	51
Download Configuration to Your Network	55

Before You Begin

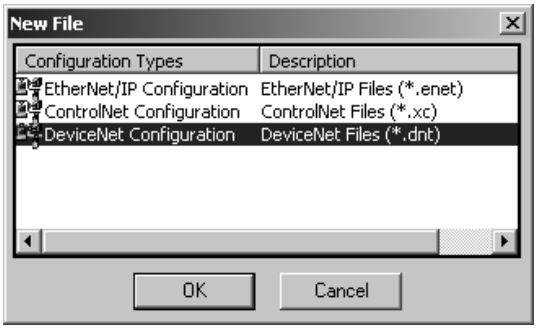
Before you configure the DeviceNet network, make sure you have a list of the devices that you put on the DeviceNet network and, at minimum, the address for each. The following table shows an example list of devices.

Device	Address	Input Size of Device (Bytes)	Input Memory in Scanner (DINTs)	Output Size of Device (Bytes)	Output Memory in Scanner (DINTs)
scanner	0	n/a	n/a	n/a	n/a
PanelView terminal	3	128	32	128	32
<empty>			2		2
I/O adapter w/ modules	5	9	3	5	2
<empty>			2		2
drive	7	4	1	4	1
<empty>			2		2
photoeye	9	1	1	0	0
computer interface	62	n/a	n/a	n/a	n/a
	63				
	Total		43		41

Create a File for the Network

Complete the following steps to create a DeviceNet configuration file.

1. Start RSNetWorx for DeviceNet software.
2. Create a file.
3. Select DeviceNet Configuration.



4. Click OK.
5. Save the file.

   Make sure you give the file a name that identifies this specific DeviceNet network.

Create Your Network in RSNetWorx for DeviceNet Software

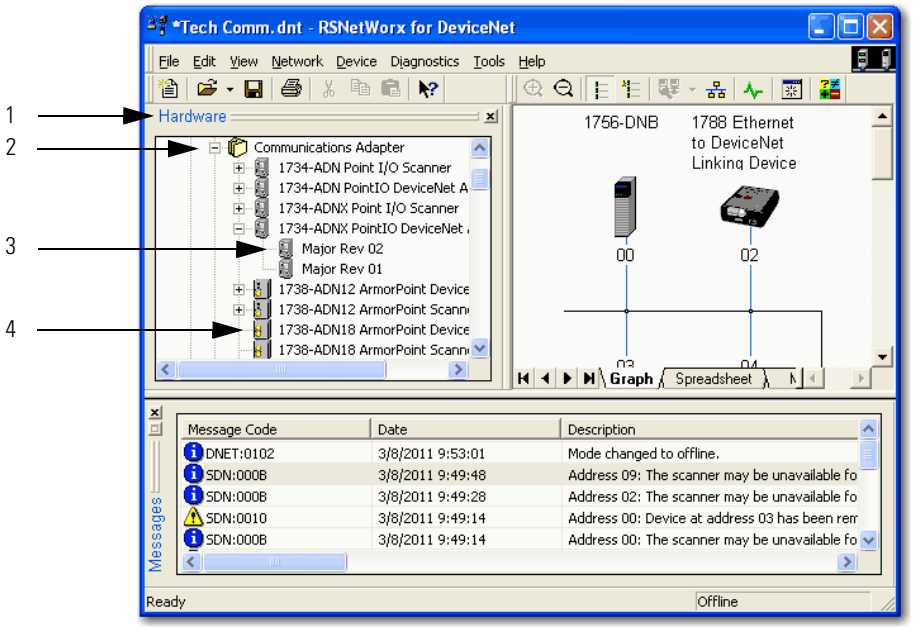
Before you configure a DeviceNet communication module in RSNetWorx for DeviceNet software, you must add it to the network configuration file.

The finished picture **should match** the collection of devices that are or will be physically connected to the DeviceNet network. If the network configuration file you create offline does not match the physical collection of devices on the network, you may experience issues when you go online with your project.

Complete the following steps to add each device to network configuration file.

1. Browse the hardware list for the device.
2. If there is a [+] sign next to the device, click the sign to expand the choices in that section.
3. Double-click the major revision of the device.

   We recommend that the major revision of all devices added to the offline network match the devices that will be connected to the online network.
4. For a device without a list of major revisions, that is, no [+] or [-] sign, double-click the device.



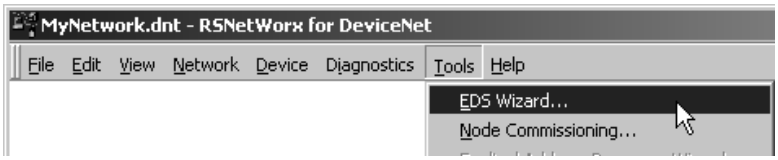
If the hardware list **does not** show a device, then RSNetWorx for DeviceNet software requires the EDS file for the device.

To add an EDS file, follow these steps.

1. To see if an EDS file is available, go to the following site:

   http://www.rockwellautomation.com/resources/eds/

2. Use the EDS wizard of RSNetWorx for DeviceNet software to register the file and see it.



Configure Each Device

After adding devices to the network configuration file, as described in Create Your Network in RSNetWorx for DeviceNet Software on page 39, you configure parameters for each device to define the modules' behavior.

IMPORTANT You can configure most devices as you add them to the network configuration file or you can add all the devices and then configure them.

Typically, you add a network scanner to the network first. In this case, we recommend that you add all devices to the network configuration file before configuring the scanner. Multiple parameters that need to be configured in the scanner's configuration, for example, building a scan list, require you to choose from devices on the network.

Refer to Configure the Scanner on page 44 for more information.

Complete these tasks when configuring DeviceNet communication modules:

- Specify a Device Node Address
- Configure Device Parameters

Specify a Device Node Address

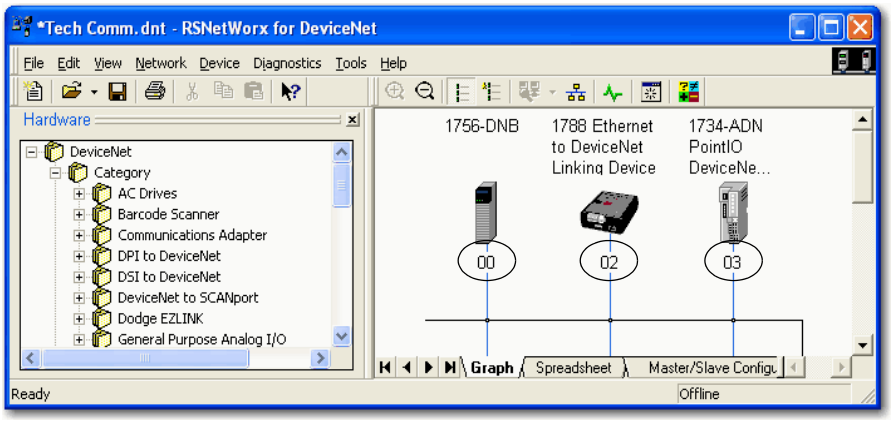
The following options are available to set a device's node address:

- Hardware mechanism, as described on page 30
- RSNetWorx for DeviceNet software, as described in this chapter
- DeviceNet node commissioning tool, as described on page 33

All DeviceNet devices ship with their node addresses set to 63. To avoid duplicate node number conditions on the network, you should change the node address for each device to unique numbers.

Give this address	To this device
0	Scanner
1…61	Your devices
62	Computer interface to the network, such as a 1784-U2DN device
63	None Out of the box, a DeviceNet communication module is preset for address 63. Leaving address 63 open lets you get a new device on the network without conflicting with another device.

When you create your network in RSNetWorx for DeviceNet software, as described on page 39, devices are automatically assigned node addresses based on the order in which they were added to the network. The number appears below the device's graphic on the screen as shown below.



As you create the network, consider the following:

- If you used a hardware mechanism to assign a node address for a device, that number takes precedence over any number you assign in RSNetWorx for DeviceNet software.

  Make sure the numbers assigned by the hardware mechanism and in your configuration file are the same for each device. For example, if the node address for a 1756-DNB ControlLogix DeviceNet Scanner is set to 2 via a hardware mechanism, but in the RSNetWorx for DeviceNet software configuration file, the node address is 0, you need to change the address in the software to 2.

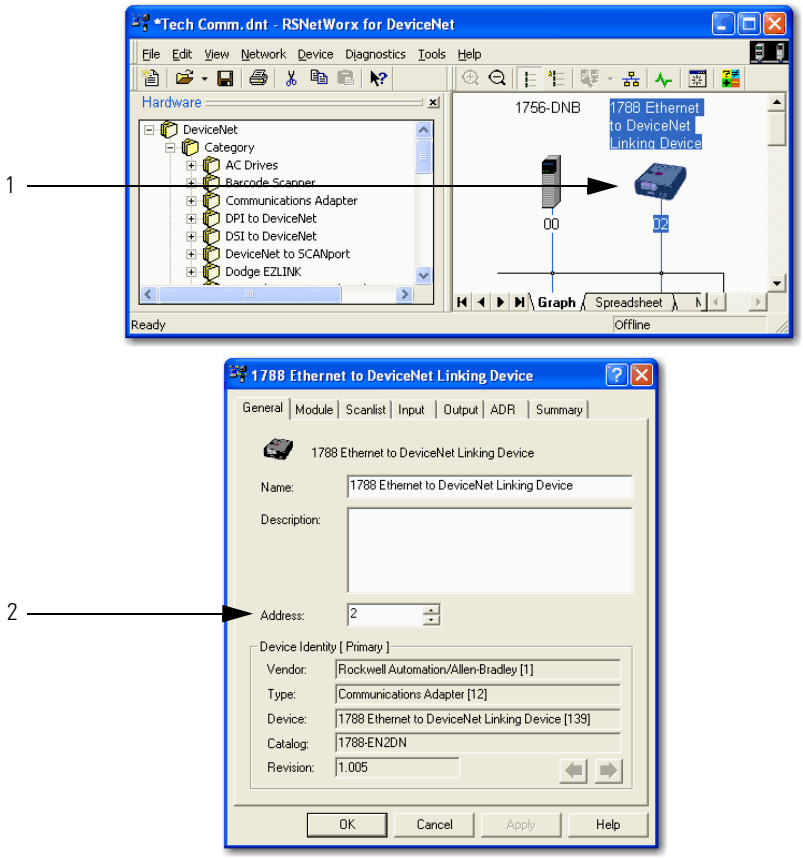
- The node addresses that are automatically assigned as you add devices to the configuration file do not take effect when the project is offline.

- For devices that do not have hardware mechanisms, the node number assigned in the network configuration file takes effect when you download the project to the DeviceNet network, as described on page 55.

Change a Device Node Address

You may need to assign a device's node address that is different from the number automatically assigned when the device is added to the configuration file. Complete the following steps to assign a device a specific node address.

1. Double-click the device.
2. Enter the node address for the device.

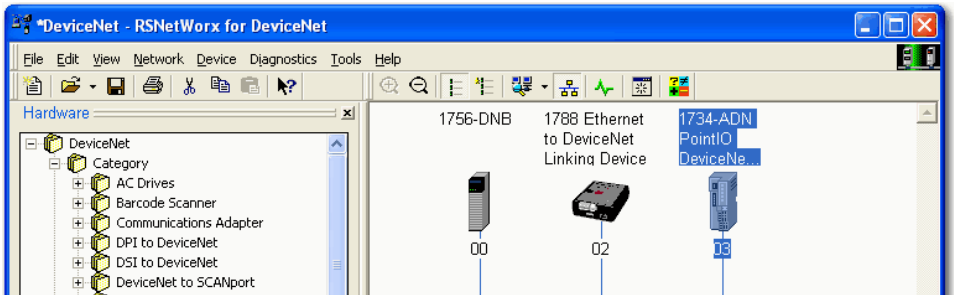


3. Click OK.

Configure Device Parameters

Complete the following steps to configure device parameters.

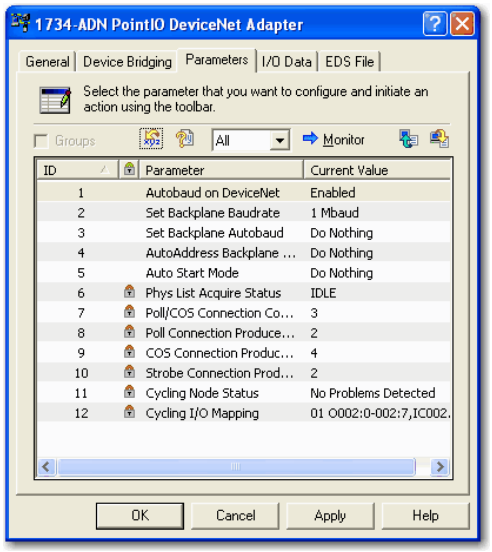
1. Double-click the device to display the configuration dialog box.



2. Click the appropriate tab.
3. Set a parameter to the desired new value.

   Typically, there are two methods to set a parameter:

   - Choose a parameter from a pull-down menu
   - Type a new value



4. Click Apply to apply the change and leave the configuration dialog box open.

   or

   Click OK to apply the change and close the configuration dialog box.

Configure the Scanner

A DeviceNet scanner manages input and output data for a controller. The scanner receives input data from I/O devices, organizes the information into scanner data tables, and sends the input data to the controller when the controller requests it. In addition, when the scanner receives output data from the controller, it sends the data to the I/O devices.

A DeviceNet scanner is the only device that can be used as a master on a DeviceNet network. When there is only one scanner on a network, it is the master for that network by default. When there are multiple scanners on the same network, each device can have only one scanner designated as its master, which is the scanner that controls its outputs.

You must configure the scanner to define how it communicates with other devices on the DeviceNet network. You must complete the following tasks to configure the scanner to communicate with the devices on the network:

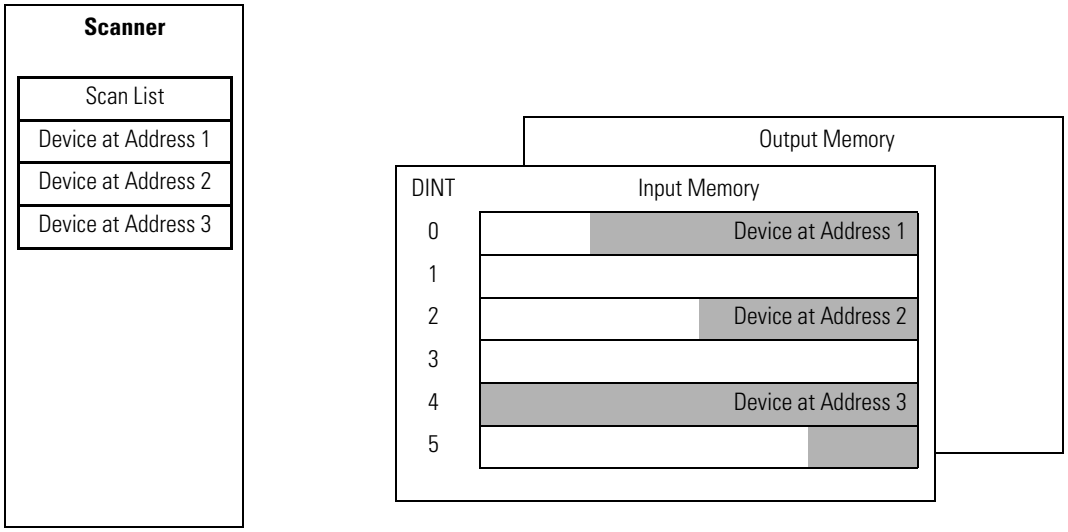
- Build the Scan List
- Set the Alignment Option
- Manually Assign Each Device to a Memory Location

IMPORTANT Make sure you configure the scanner **after** you add all devices to the network. When you add a device to the network, it automatically appears in the list of available devices for the scanner's scan list.

If you build a scan list and then add another device to the network, it will not be included in the scan list until you repeat the steps in the next section.

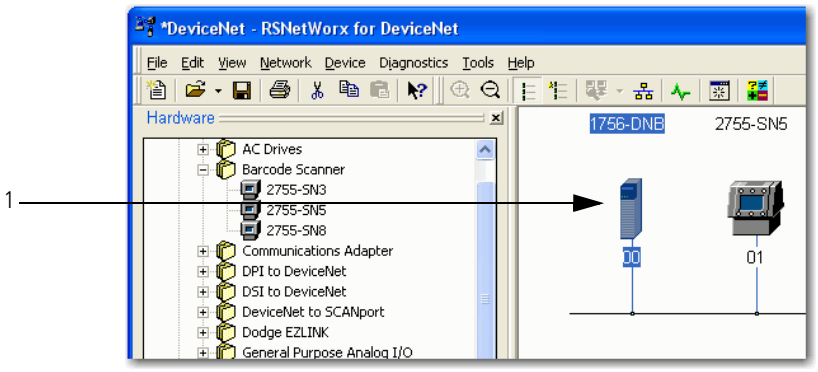
Build the Scan List

A scan list is a list of devices with which the scanner communicates. For each device in the scanner's scan list, the scanner sets aside input or output memory for the data of the device.

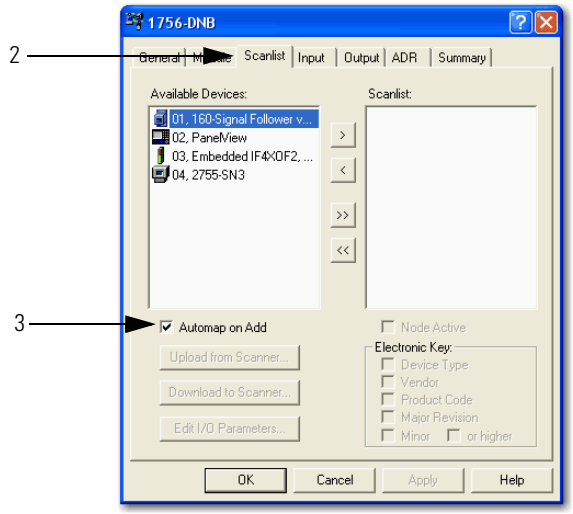


Complete the following steps to build a scan list.

1. Double-click the scanner to display configuration dialog box.



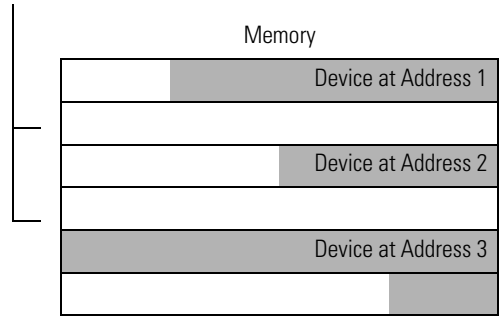
2. Click the Scanlist tab.
3. Clear or check Automap on Add.



RSNetWorx for DeviceNet software can automatically assign the memory location for each device.

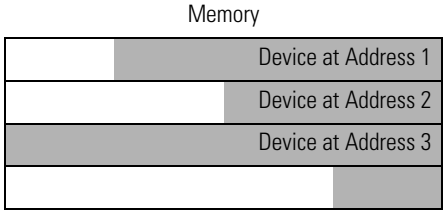
a. If you want to leave gaps between devices in the memory as shown below, clear the box.

Leave Gaps Between Devices

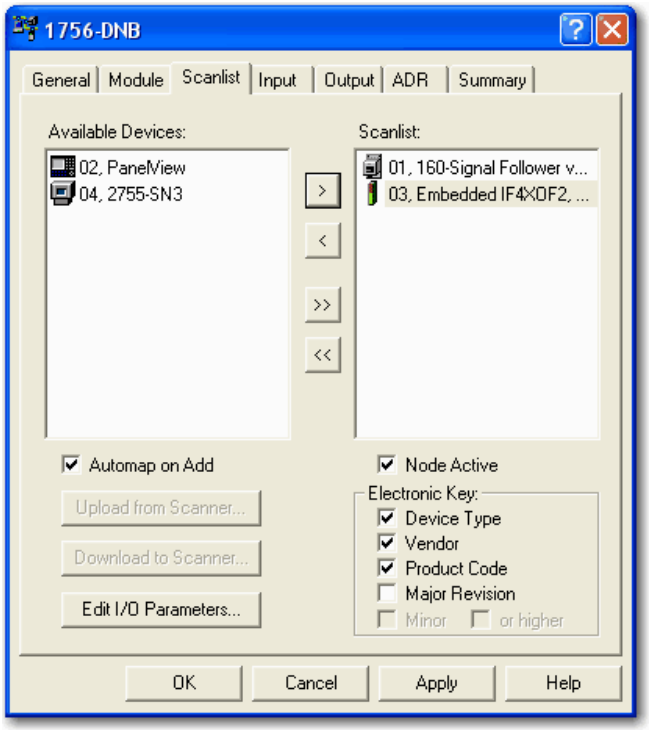


b. If you want to place devices in sequential DINT's as shown below, leave the box checked. When you check the box, the software automatically assigns a memory location for each device as you add it to the scan list.

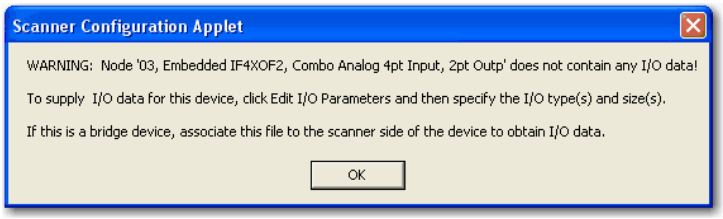
Place Devices in Sequential DINTs



4. Move devices from the Available Devices column to the Scanlist column.



5. If you get the following warning for a device, see Set the I/O Parameters of a Device on page 167.



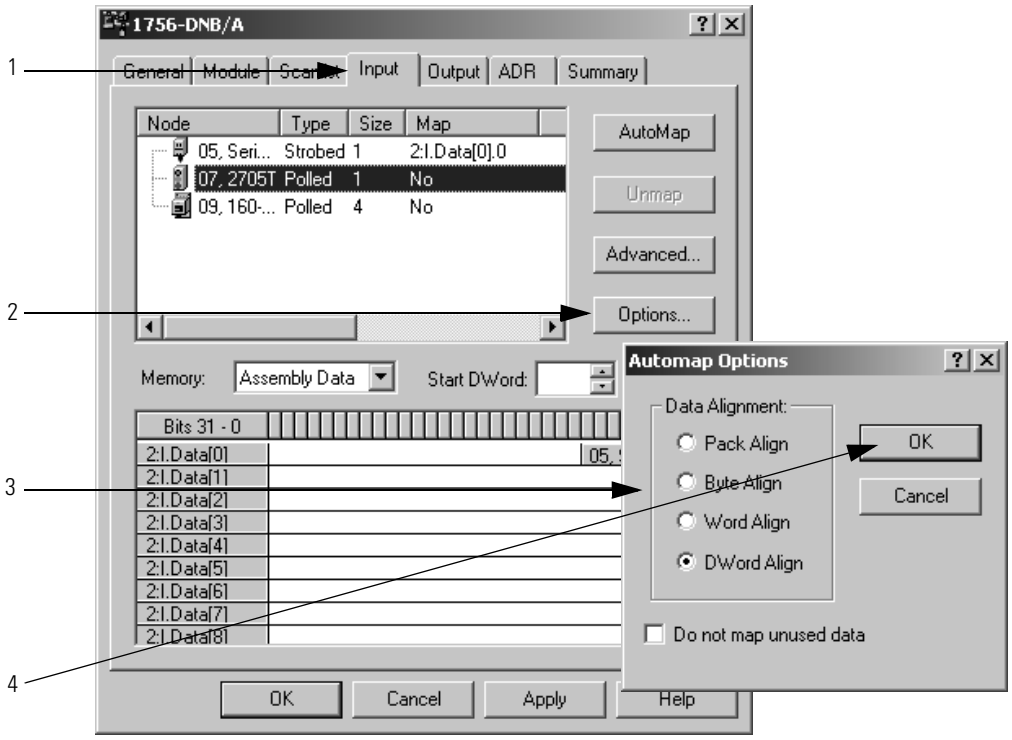
Set the Alignment Option

Choose a data alignment option to map the I/O data so that it is aligned on a boundary, such as a byte, word, or double-word, or efficiently grouped without alignment in the input or output memory map. To map I/O data so it is grouped without alignment, click the Pack Align option.

IMPORTANT The alignment option you choose applies to both the input and output maps.

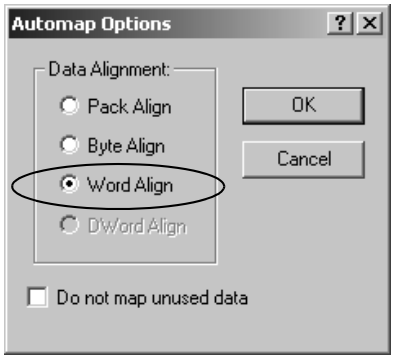
Complete the following steps to select an alignment option.

1. Click the Input tab.
2. Click Options.
3. Click the desired data alignment.
4. Click OK to close the Automap Options dialog box.



SoftLogix 5800 Controller

The SoftLogix 5800 scanner 1784-PCIDS organizes its input and output memory in 16-bit words. For that scanner, click the Word Align option.

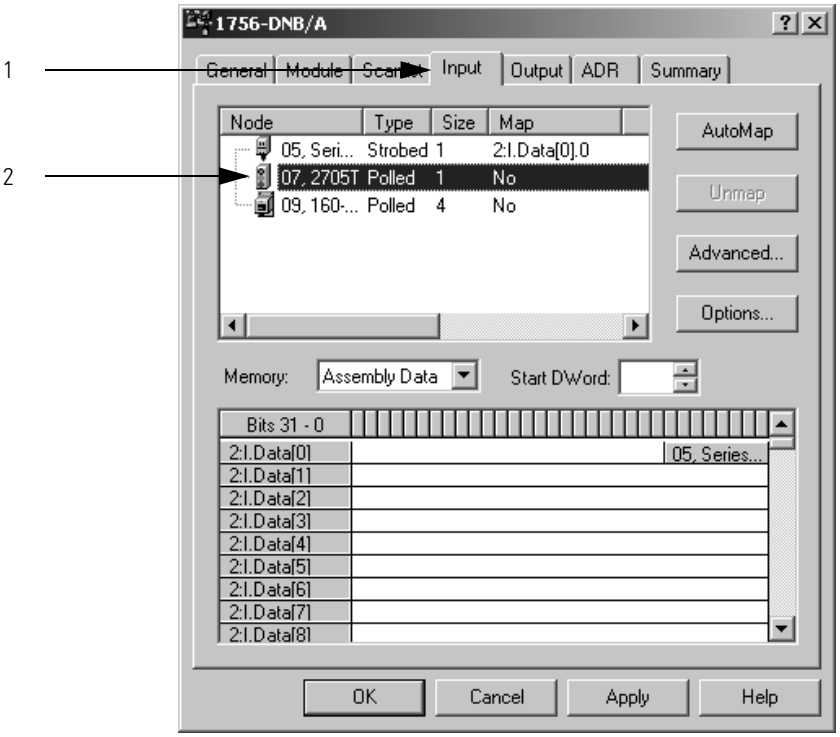


Manually Assign Each Device to a Memory Location

You can manually assign locations for device data.

IMPORTANT	If you configured the software to automatically assign memory locations as devices are added, as described on page 45, skip this section.

1. Click the Input tab.
2. Select the device.

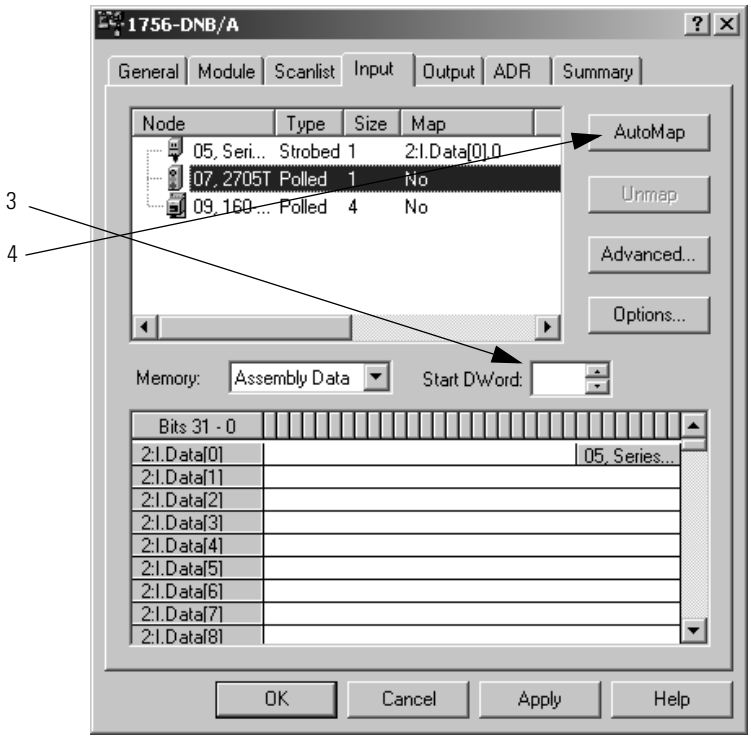


3. In the Start DWord field, enter the element number to which you want to assign the data.

   This is the starting point for the data. Larger data sizes wrap to several elements. For example, to start the data in . . . Data[3], enter 3 in the Start DWord box.

4. Click Automap.

   An entry for the device appears in the input array.



5. Click the Output tab and repeat step 2 through step 4.

6. Click OK to complete the scanner configuration.

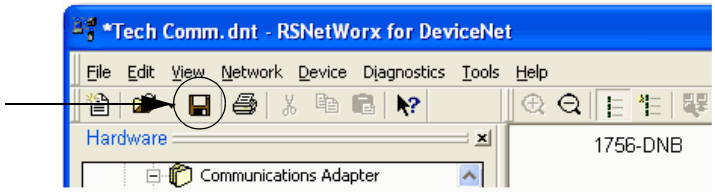
Sometimes, a specific input or output value may end up as the upper bytes of a DINT in the scanner.

Instance 70 Data Format (Basic Speed Control Input Assembly)								
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0						Running1		Faulted
1								
2	Speed Actual RPM (Low Byte)							
3	Speed Actual RPM (High Byte)							

To make your programming easier, use advanced mapping to re-map the value to its own memory location. For more information, see Map the Memory Location with Advanced Mapping on page 183.

Save the Configuration File

After you configure each device on the network, including the scanner, save the file.



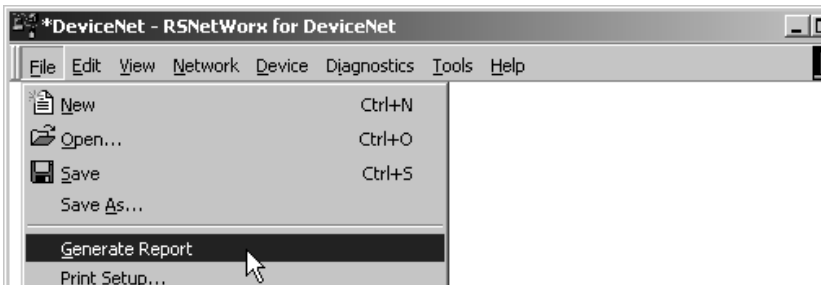
Generate an RSNetWorx for DeviceNet Report

An RSNetWorx for DeviceNet report shows these items:

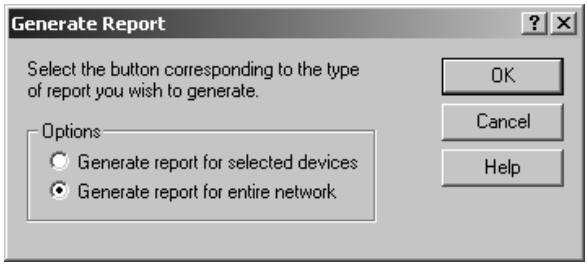
- Devices on the network
- Memory addresses of those devices in the scanner
- Device configurations

The report is a useful reference when you program your system. Complete the following steps to generate a report.

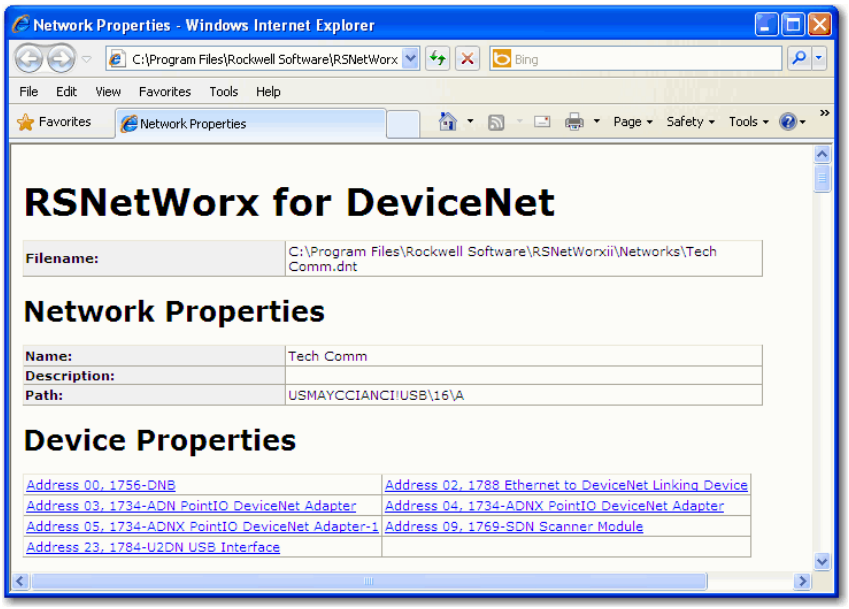
1. From the File menu in RSNetWorx for DeviceNet software, choose Generate Report.



2. Click Generate report for entire network.



The report appears in your web browser.



Go Online to Your Network

When you are finished configuring the network configuration file offline, you may be ready to go online and download the network configuration file to the network.

IMPORTANT Before you can go online and download the network configuration file to the DeviceNet network, you must have completed the following tasks:

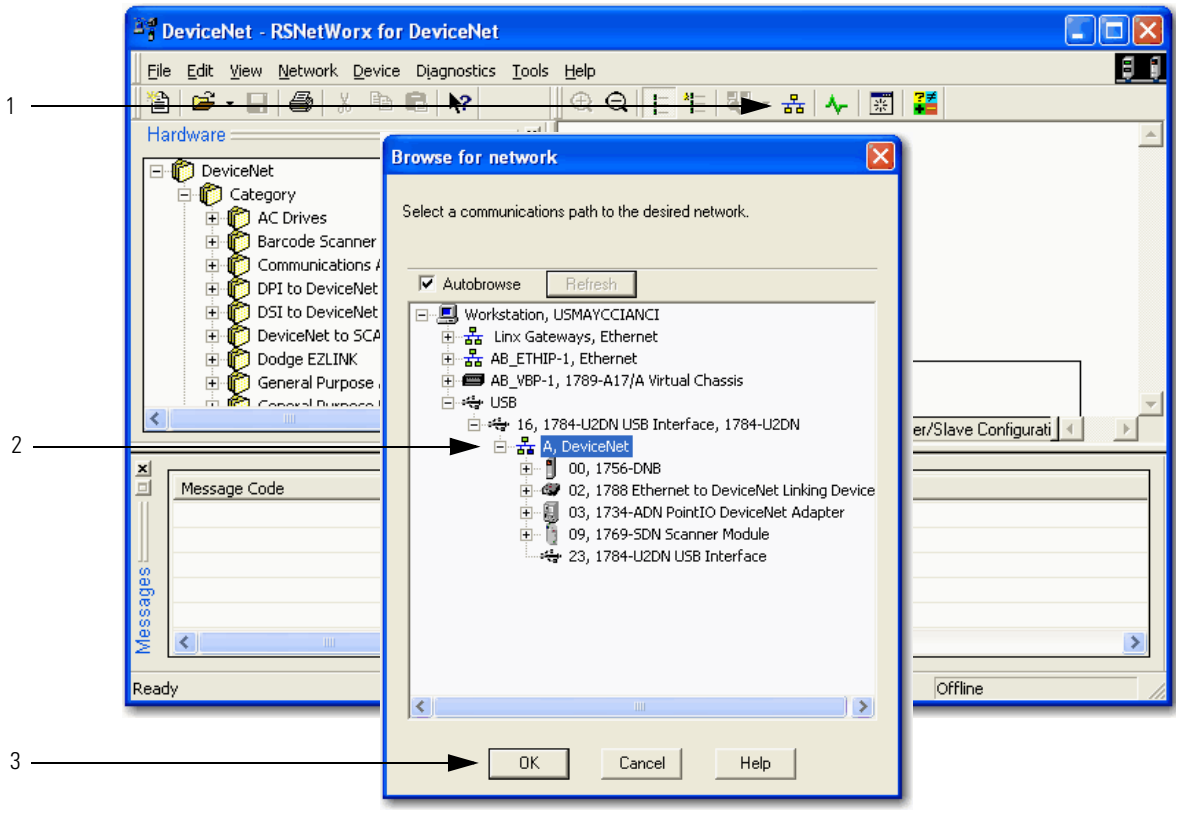
- Connect a computer to the network, as described in Chapter 2
- Connect all required devices to the network, as described in Chapter 3

When you go online to a DeviceNet network, RSNetWorx for DeviceNet software browses the network once and shows the devices on the network. Remember the following when you go online:

- RSNetWorx for DeviceNet software does not read (upload) or change (download) the parameters of any of the devices.
- The picture you see remains static. It does not show any changes since the last browse.
- The network configuration file configured offline must match the picture created when RSNetWorx for DeviceNet software browses the network.

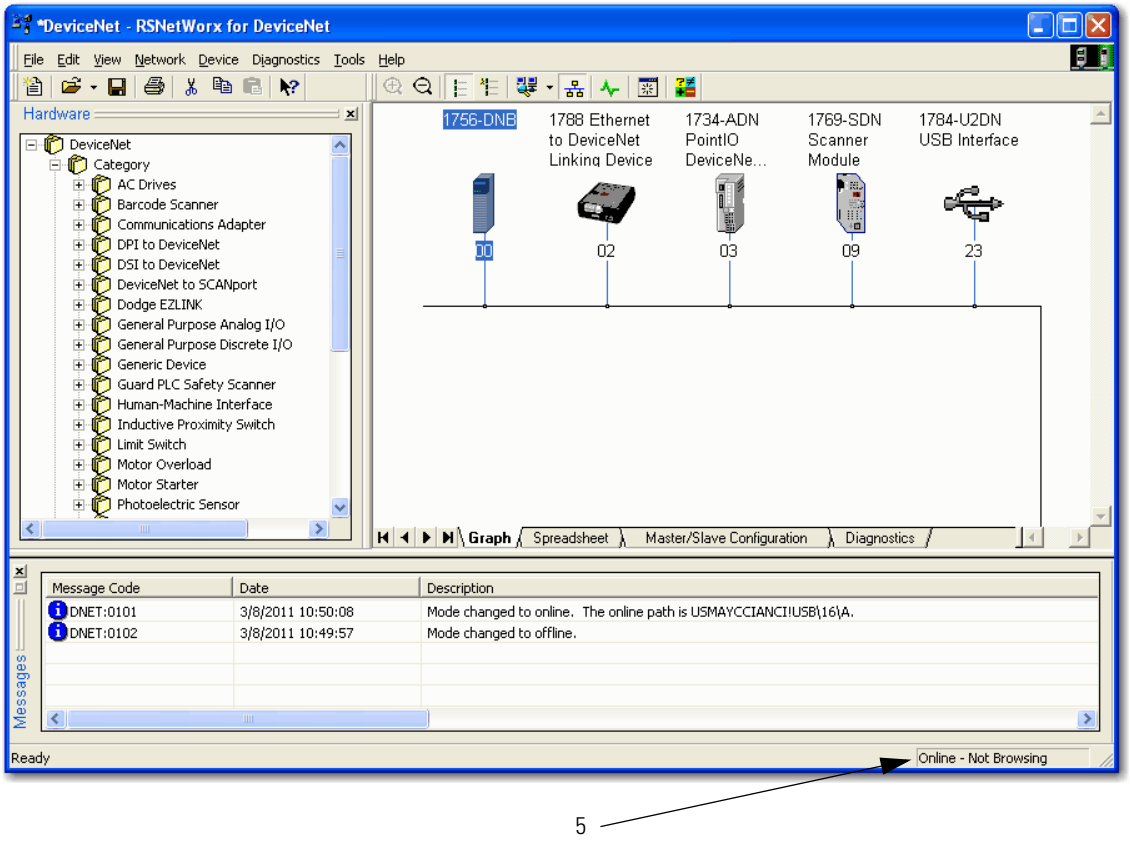
Complete the following steps to go online.

1. Click the Online button.
2. Select the DeviceNet network.
3. Click OK.



4. When the pop-up message appears, click OK.

5. Verify that you are online.



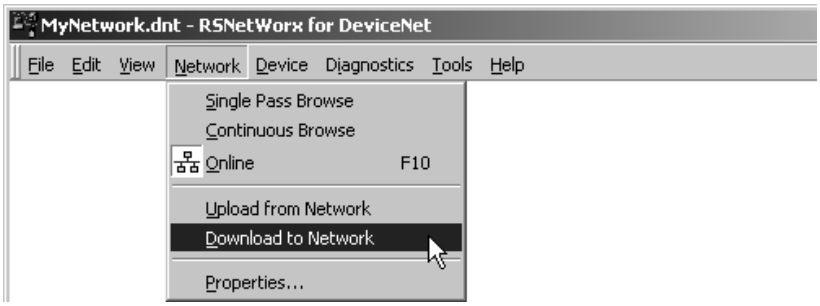
Download Configuration to Your Network

After you go online with the network configuration file you created while offline, you can download the configuration to the network.

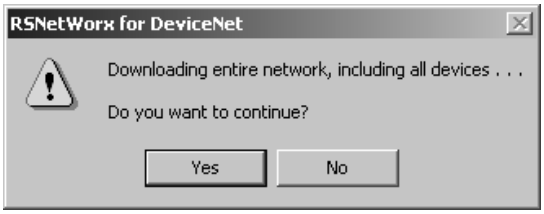
IMPORTANT	Before you download configuration to the network, make sure the scanner is in Idle mode. To put the scanner in Idle mode, do one of the following: • Place the controller in program/remote program mode. • Turn off the …O.CommandRegister.Run bit of the scanner.

Complete the following steps to download configuration to the DeviceNet network.

1. From the File menu in Network>Download to Network.



2. When prompted, click Yes to download the entire network.



Notes:

Configure the Network Online

This chapter explains how to configure the network online with RSNetWorx for DeviceNet software.

Topic	Page
Before You Begin	58
Verify Communication Between the Computer and Devices	58
Create a New File for the Network	60
Go Online to Your Network	60
Configure Each Device	63
Configure the Scanner	66
Upload and Save the Configuration File	76
Generate an RSNetWorx for DeviceNet Report	77

Configuring the network online reduces the number of configuration tasks you must complete compared to configuring the network offline. Configuring the network online has these advantages:

- Devices on the network automatically appear in your network configuration file as soon as you go online. You do not need to add the devices to the network configuration file.
- The network configuration file automatically matches the physical setup of devices on the network as well as the major and minor revisions of the online devices.
- The configuration is guaranteed to match the major and minor revisions of the online devices.
- You can easily upload device configurations to your network configuration file, make changes to the configuration parameters, and download them to the device.

Before You Begin

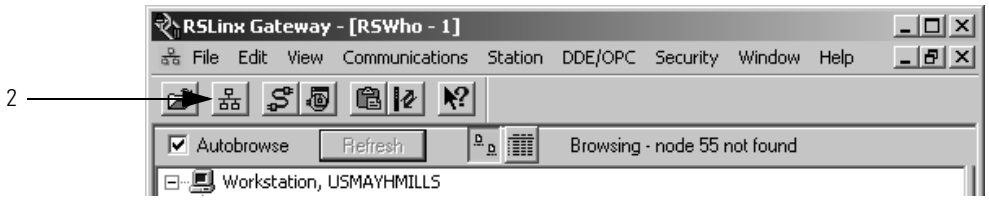
Before you configure the network, make sure you have a list of the devices that are on the network and, at minimum, the node address for each of them. The following table shows an example list of devices.

Device	Address	Input Size of Device (Bytes)	Input Memory in Scanner (DINTs)	Output Size of Device (Bytes)	Output Memory in Scanner (DINTs)
scanner	0	n/a	n/a	n/a	n/a
PanelView terminal	3	128	32	128	32
<empty>			2		2
I/O adapter w/ modules	5	9	3	5	2
<empty>			2		2
drive	7	4	1	4	1
<empty>			2		2
photoeye	9	1	1	0	0
computer interface	62	n/a	n/a	n/a	n/a
	63				
	Total		43		41

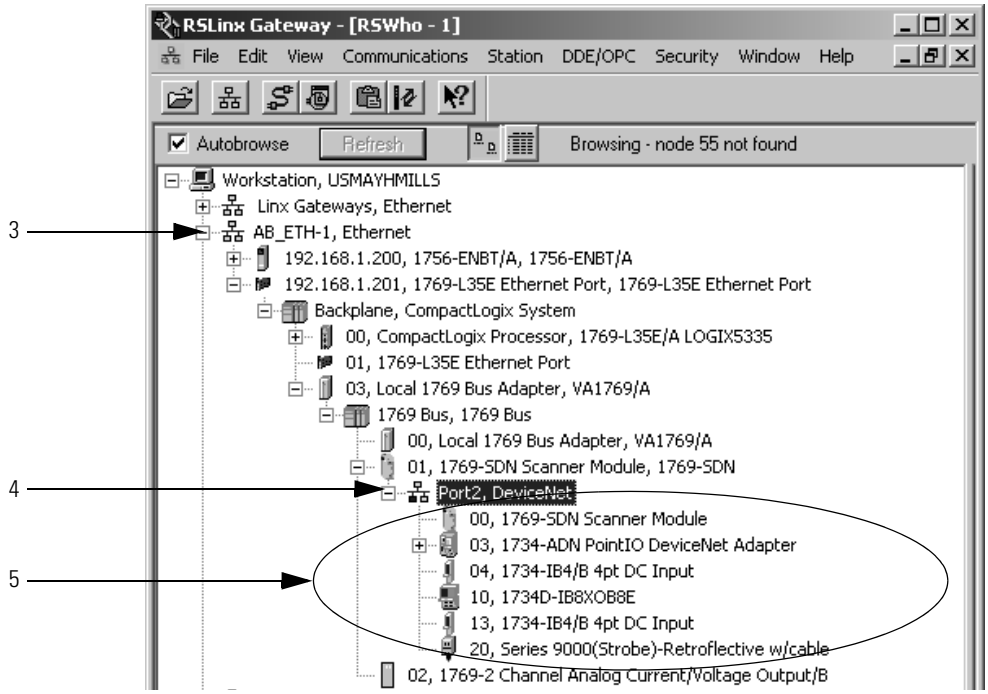
Verify Communication Between the Computer and Devices

To configure your network online, your computer must be able to communicate with each device on the DeviceNet network. Use RSLinx communication software to verify that you can communicate with all the devices.

1. Start RSLinx communication software.
2. Click the Online button.



3. Expand a driver that lets you access the DeviceNet network.
4. Select the DeviceNet network.
5. Make sure you see all the devices that are connected to the DeviceNet network.



IMPORTANT If you cannot view the network, verify that your computer is connected to the network. Refer to Chapter 2 on page 25 for more information on how to connect the computer to the network.

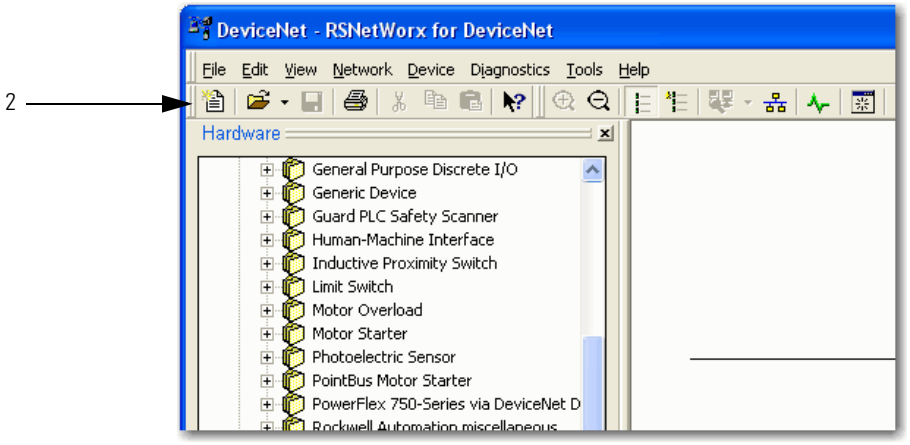
If you can view the network but cannot see all the devices that should be on the network, verify the devices are connected to the network. Refer to Chapter 3 on page 29 for more information on how to connect the devices to the network.

Create a New File for the Network

Before you go online, you must create a new network configuration file.

Complete the following steps to create a DeviceNet configuration file.

1. Start RSNetWorx for DeviceNet software.
2. Create a file.



Go Online to Your Network

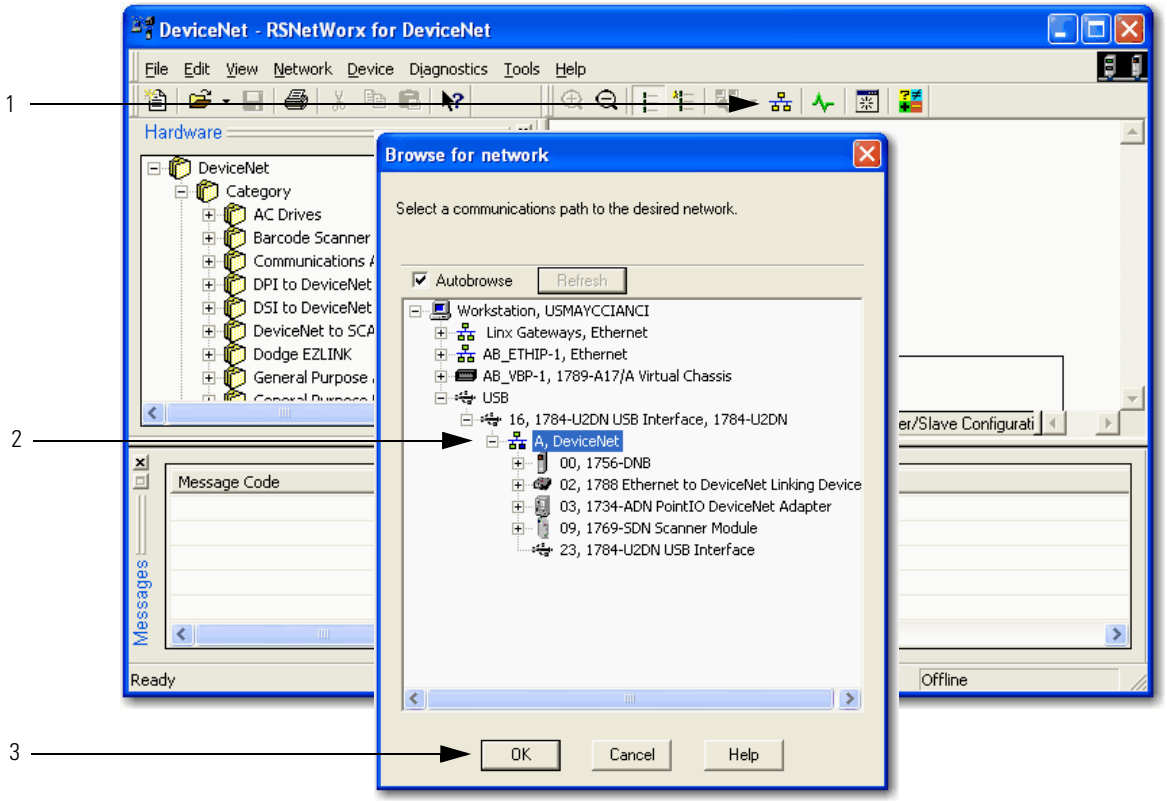
When you go online, RSNetWorx for DeviceNet software browses the network once and shows the devices currently on the network in the new network configuration file.

Keep in mind the following when you go online:

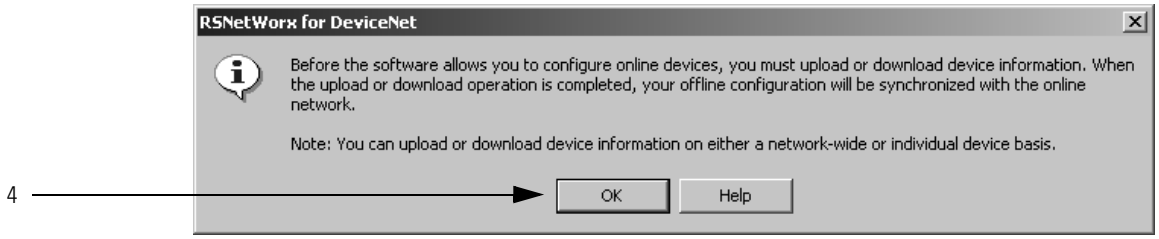
- RSNetWorx for DeviceNet software does not read (upload) or change (download) the parameters of any of the devices on the network.
- The picture that results from browsing remains static. It does not show any changes since the last browse.

Complete the following steps to go online.

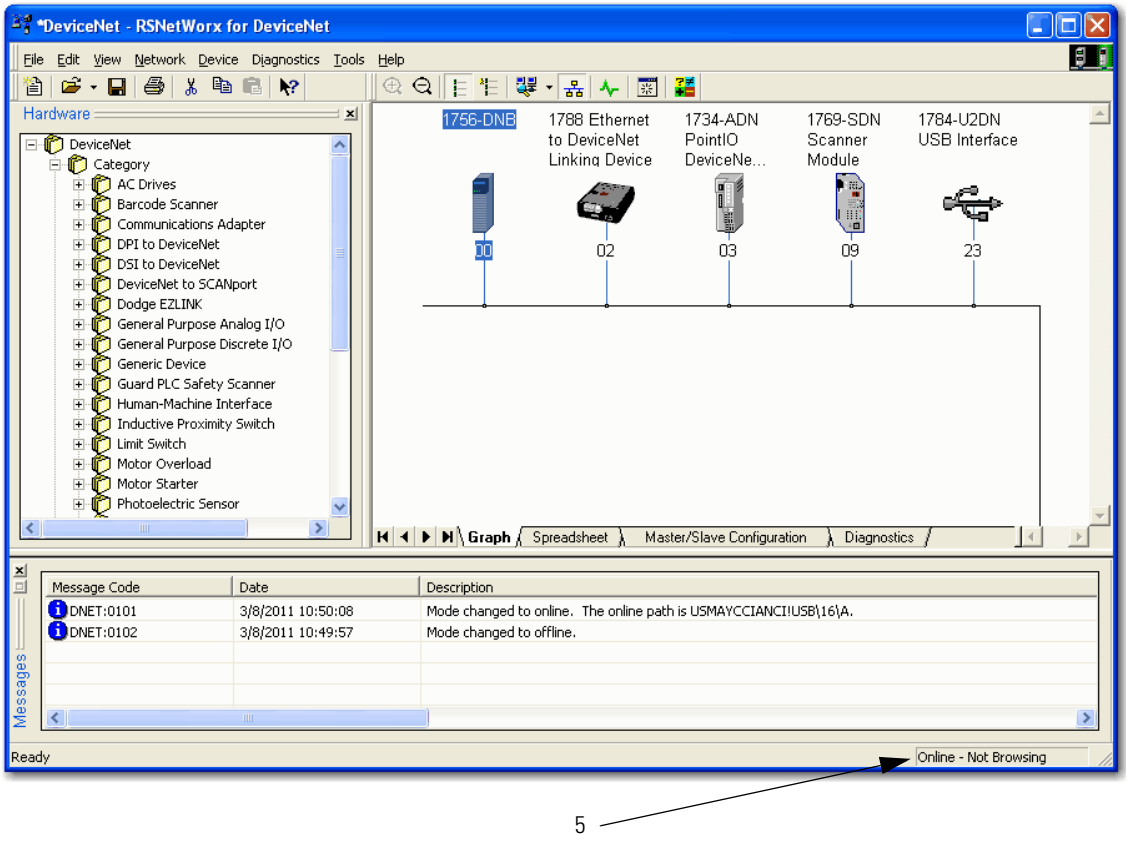
1. Click the Online button.
2. Select the DeviceNet network.
3. Click OK.



4. When the pop-up message appears, click OK.



5. Verify that you are online.



Configure Each Device

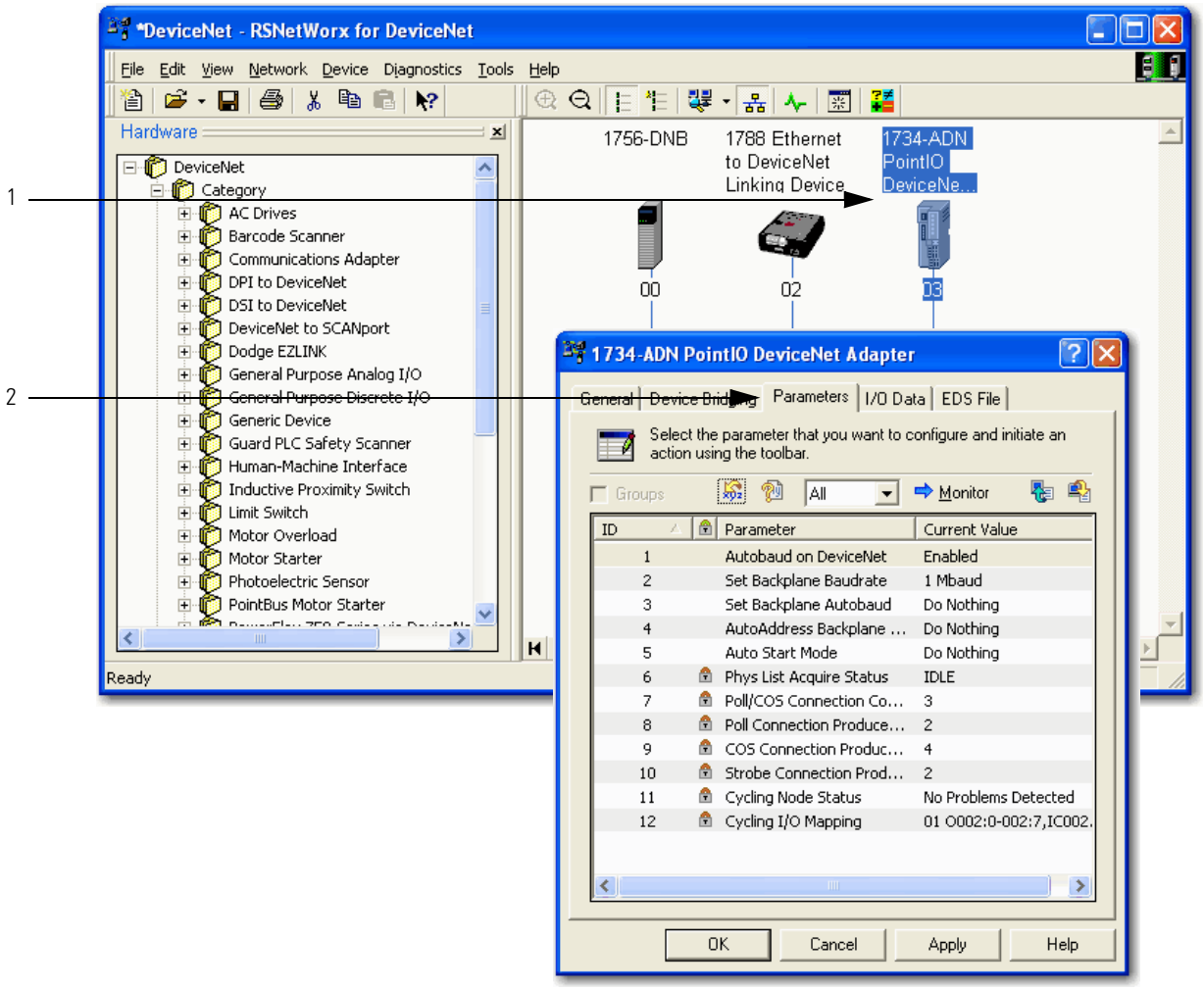
Once the devices on the DeviceNet network appear in the network configuration file, complete these tasks to change the configuration for a device:

- Upload the Configuration of a Device
- Change and Download Device Configuration

Upload the Configuration of a Device

When you configure the network online, the devices on the network have parameters configured. Complete the following steps to upload configuration from a device to the network configuration file.

1. Double-click the device to open the configuration dialog box.
2. Click the Parameters tab.



3. When prompted, upload the configuration from the device to the network configuration file.

Change and Download Device Configuration

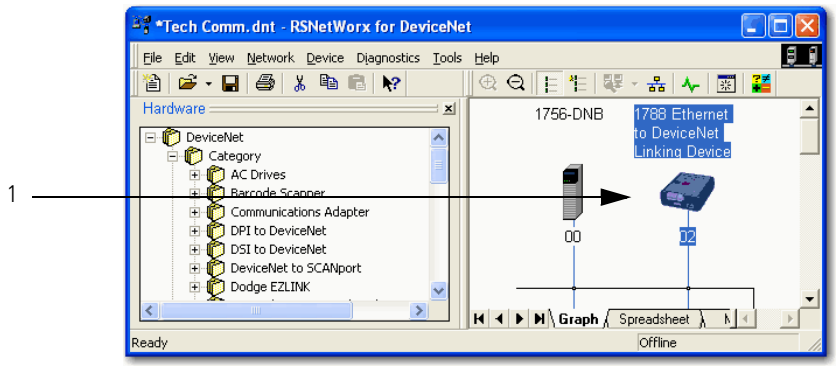
After you upload a device's configuration to the network configuration file, you can make changes to the configuration and download it.

Complete the following steps to change and download new configuration parameters.

1. Double-click the device to open the configuration dialog box.

   or

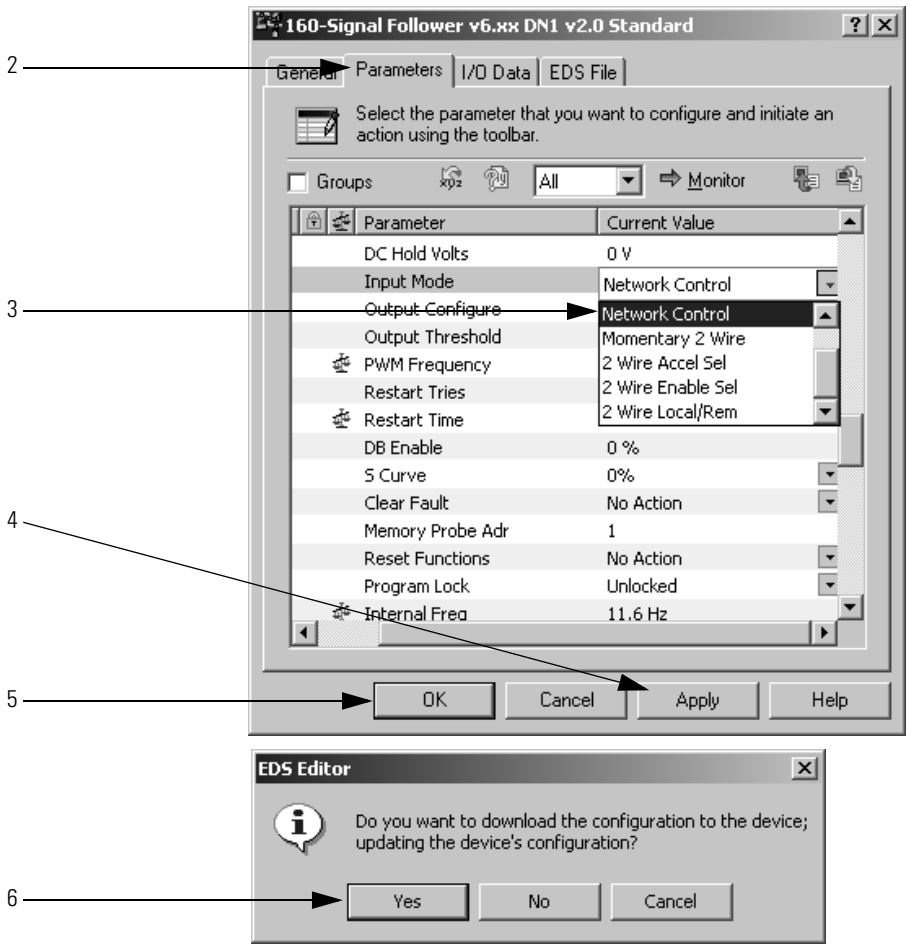
   If the device configuration has already been uploaded and the configuration dialog box is open, go to step 2.



   The configuration dialog box appears.

2. Click the appropriate tab.
3. Set a parameter to the desired new value.

   Typically, there are two methods to change a parameter:
   - Choose a parameter from a pull-down menu
   - Type a new value
4. Apply the changes.
5. Click OK to close the dialog box.
6. When prompted, download the changes.


2
3
4
5
6
160-Signal Follower v6.xx DN1 v2.0 Standard
General
Parameters
I/O Data
EDS File
Select the parameter that you want to configure and initiate an action using the toolbar.
Groups
All
Monitor
Parameter
Current Value
DC Hold Volts
0 V
Input Mode
Network Control
Output Configure
Output Threshold
PWM Frequency
Restart Tries
Restart Time
DB Enable
0 %
S Curve
0%
Clear Fault
No Action
Memory Probe Adr
1
Reset Functions
No Action
Program Lock
Unlocked
Internal Freq
11.6 Hz
Network Control
Momentary 2 Wire
2 Wire Accel Sel
2 Wire Enable Sel
2 Wire Local/Rem
OK
Cancel
Apply
Help
EDS Editor
Do you want to download the configuration to the device; updating the device's configuration?
Yes
No
Cancel

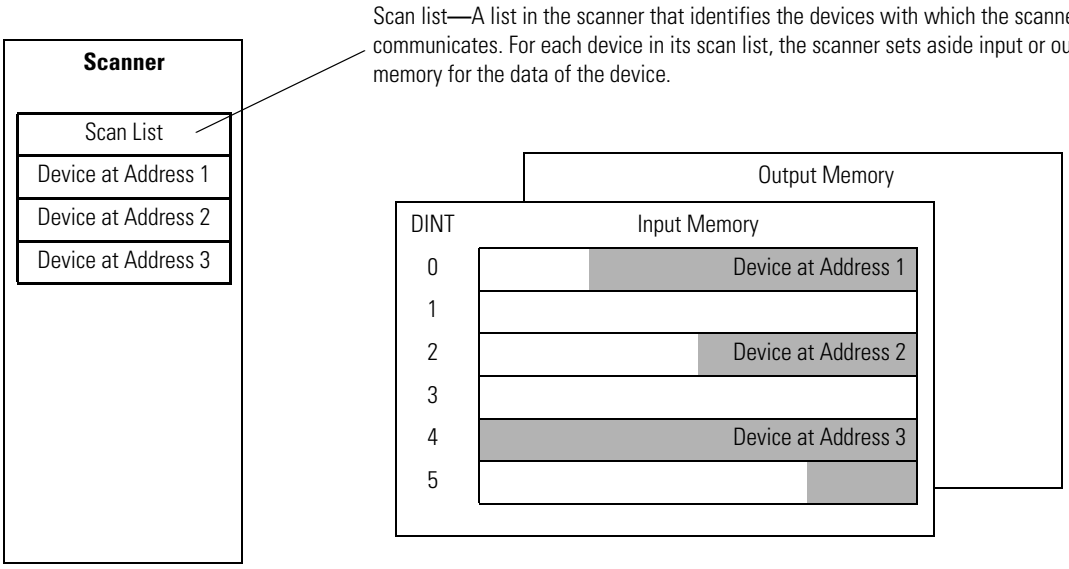
Configure the Scanner

A DeviceNet scanner manages input and output data for a controller. The scanner receives input data from I/O devices, organizes the information into scanner data tables, and sends the input data to the controller when the controller requests it. In addition, when the scanner receives output data from the controller, it sends the data to the I/O devices.

A DeviceNet scanner is the only device that can be used as a master on a DeviceNet network. When there is only one scanner on a network, it is the master for that network by default. When there are multiple scanners on the same network, each device can have only one scanner designated as its master, which is the scanner that controls its outputs.

You must configure the scanner to define how it communicates with other devices on the DeviceNet network. When you are configuring the network online, complete the following tasks to configure the scanner:

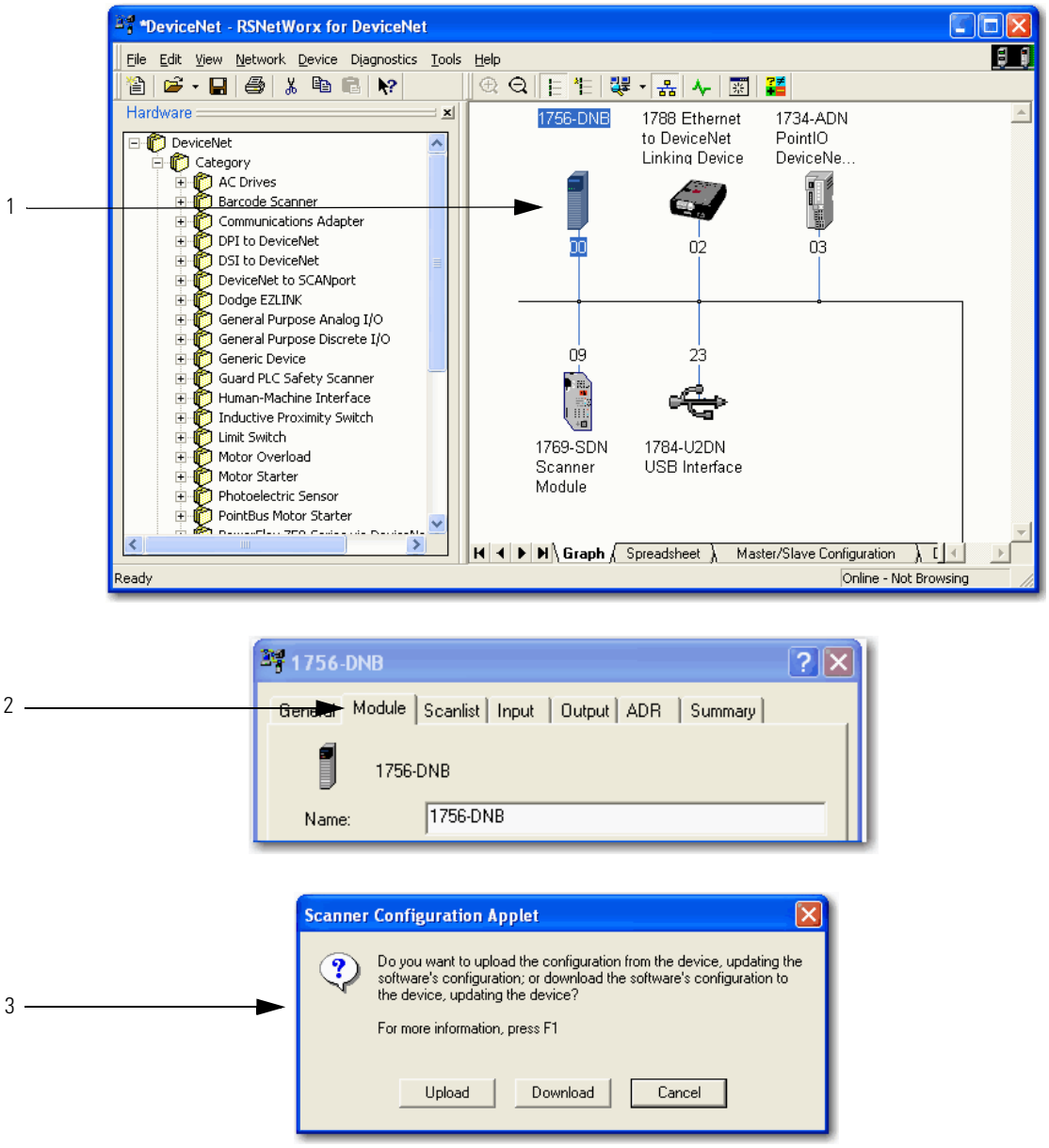
- Upload the Current Scanner Configuration
- Define the Scanner Properties
- Build the Scan List
- Set the Alignment Option



Upload the Current Scanner Configuration

Complete the following steps to upload the current scanner configuration.

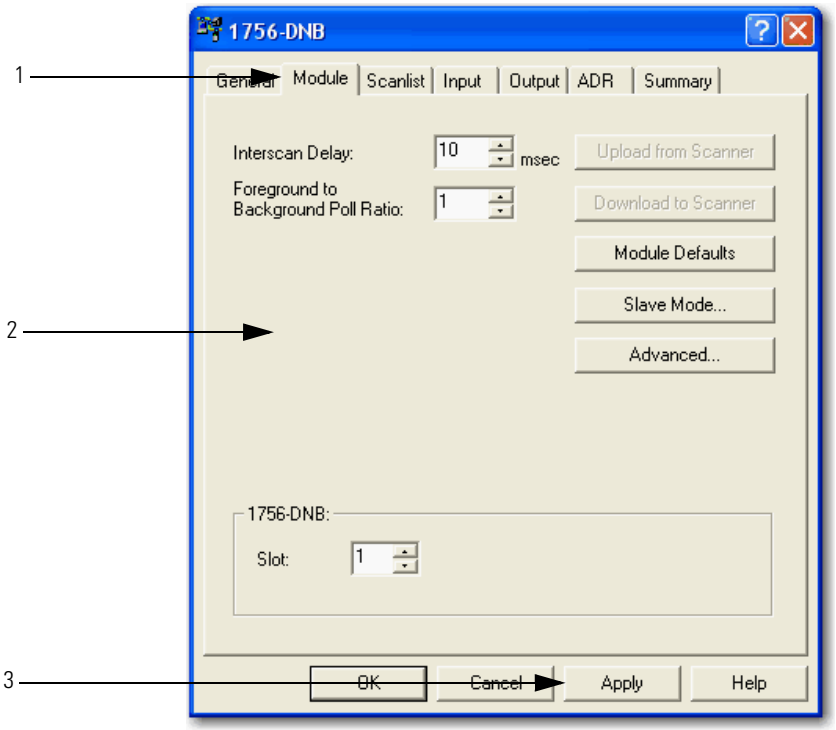
1. Double-click the scanner to open the configuration dialog box.
2. Click the Module tab.
3. When prompted, upload the configuration from the scanner.



Define the Scanner Properties

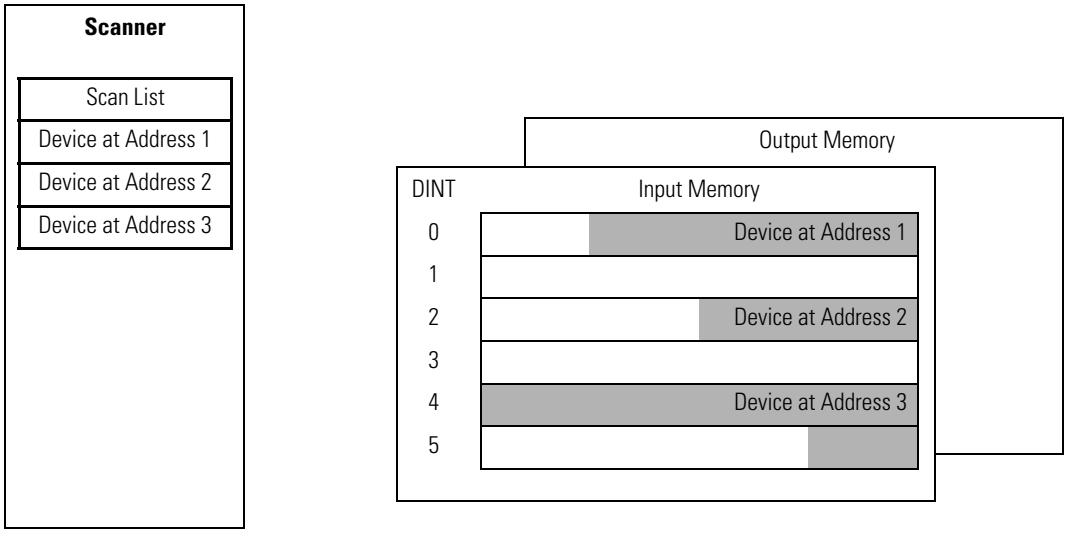
Complete the following steps to change the scanner properties, if necessary.

1. Click the Module tab.
2. Make the necessary changes.
3. Click Apply to make the changes.
4. When a message prompts you to indicate whether to download your changes to the scanner, click No to continue configuring the scanner on additional tabs.



Build the Scan List

A scan list is a list of devices with which the scanner communicates. For each device in the scanner's scan list, the scanner sets aside input or output memory for the data of the device.

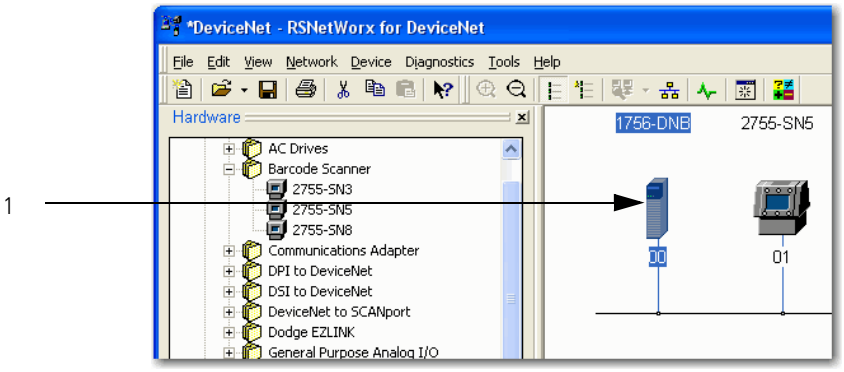


Complete the following steps to build a scan list.

1. Double-click the scanner to open the configuration dialog box.

   or

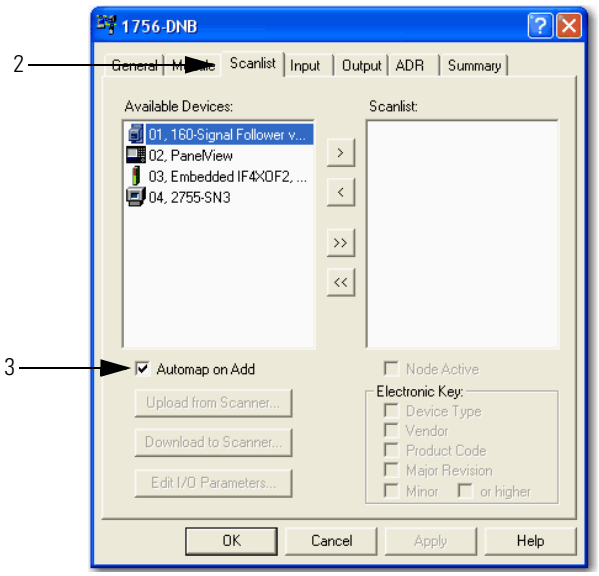
   If the scanner configuration has already been uploaded and the configuration dialog box is open, go to step 2.



2. Click the Scanlist tab.

   The devices on the network appear in the Available Devices column.

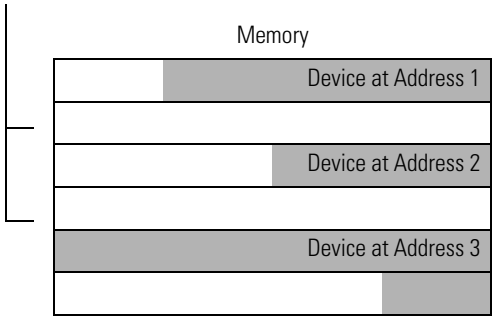
3. Clear or check Automap on Add.



RSNetWorx for DeviceNet software can automatically assign the memory location for each device.

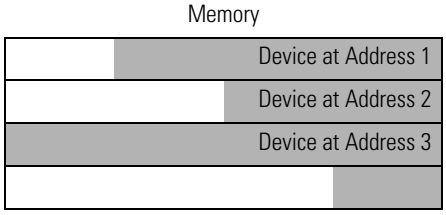
a. If you want to leave gaps between devices in the memory, as shown below, clear the box.

Leave Gaps Between Devices

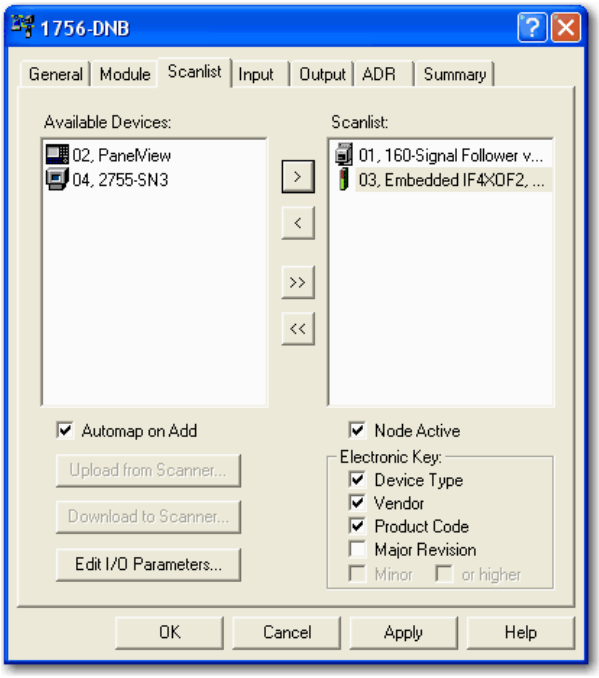


b. If you want to place devices in sequential DINT's, as shown below, leave the box checked. When you check the box, the software automatically assigns a memory location for each device as you add it to the scan list.

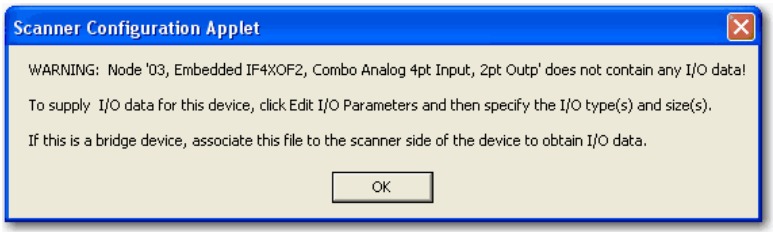
Place Devices in Sequential DINTs



4. Move devices from the Available Devices column to the Scanlist column.



If you get the following warning for a device, see Set the I/O Parameters of a Device on page 167.



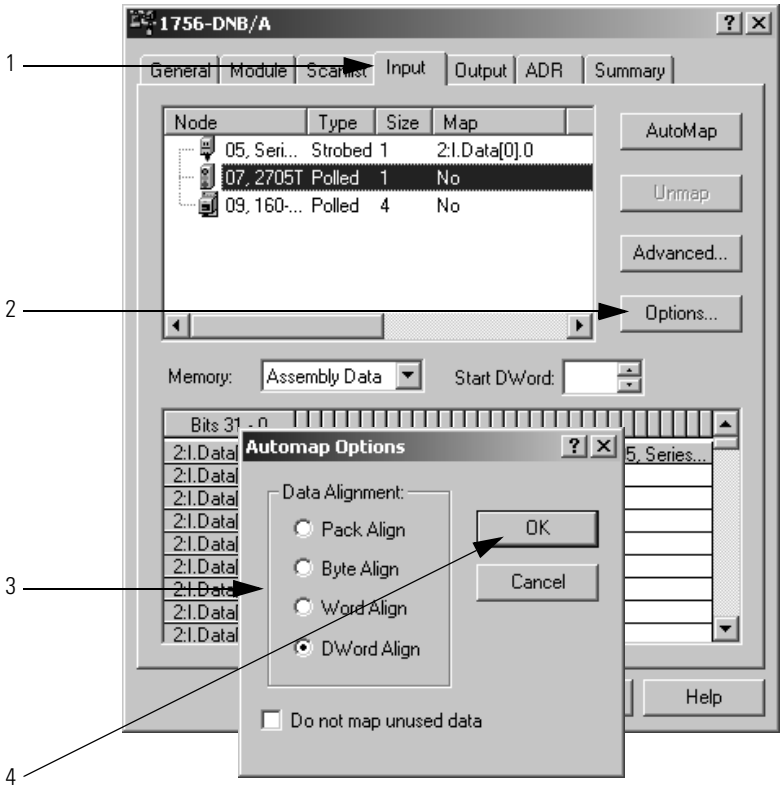
Set the Alignment Option

Use the alignment option to map the I/O data so that it is aligned on a boundary, such as a byte, word, or double-word, or efficiently grouped without alignment in the input or output memory map. To map I/O data so it is grouped without alignment, click the Pack Align option.

IMPORTANT The alignment option you choose applies to both the input and output maps.

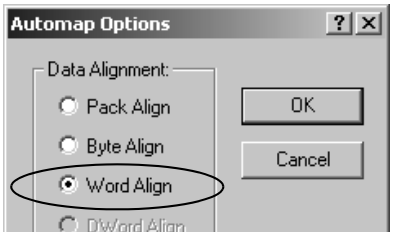
Complete the following steps to select an alignment option.

1. Click the Input tab.
2. Click Options.
3. Click the desired data alignment.
4. Click OK.



SoftLogix 5800 Controller

In SoftLogix 5800 applications, the 1784-PCIDS scanner organizes its input and output memory in 16-bit words. For that scanner, click Word Align.



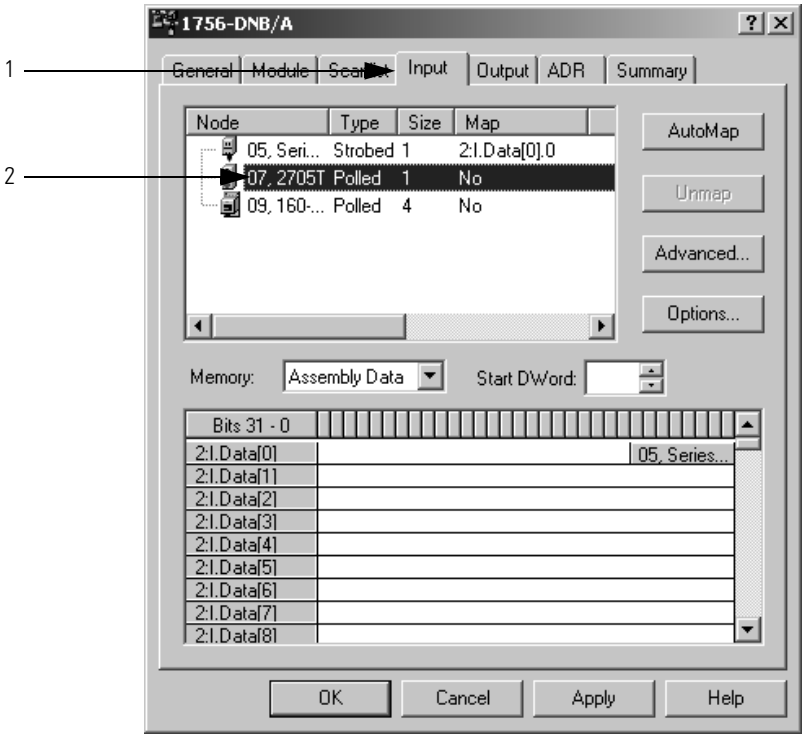
Manually Assign Each Device to a Memory Location

You can manually assign locations for device data.

IMPORTANT	If you configured the software to automatically assign memory locations as devices are added, as described on page 70, skip this section.

Complete the following steps to manually assign each device to a memory location.

1. Click the Input tab.
2. Select the device.

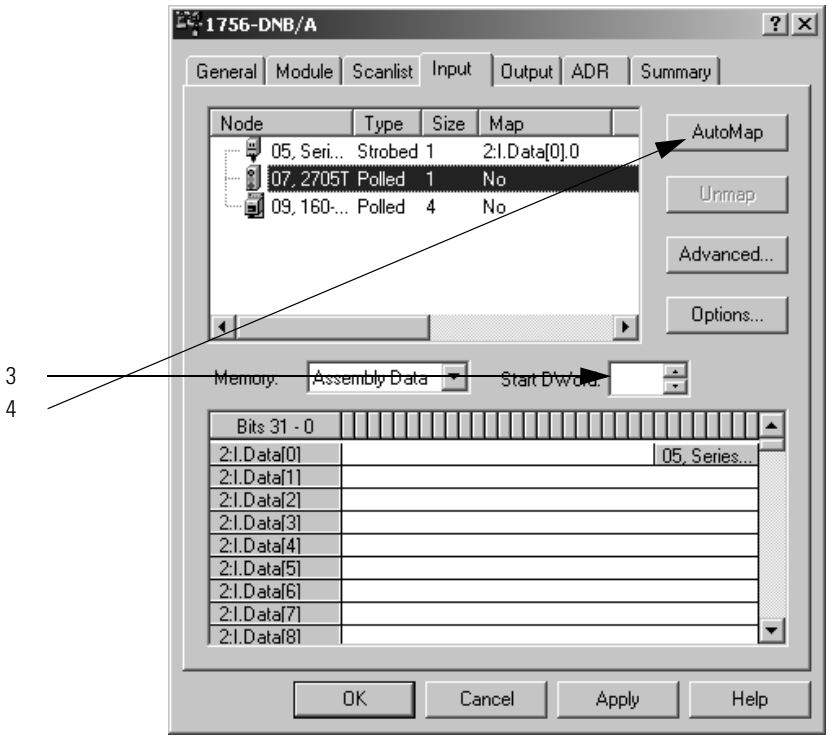


3. In the Start DWord field, enter the element number to which you want to assign the data.

   This is the starting point for the data. Larger data sizes wrap to several elements. For example, to start the data in . . . Data[3], type 3 in the Start DWord box.

4. Click Automap.

   An entry for the device shows up in the input array.



5. Click the Output tab and repeat step 2 through step 4.

6. Click OK to complete scanner configuration.

Sometimes, a specific input or output value may end up as the upper bytes of a DINT in the scanner.

Instance 70 Data Format (Basic Speed Control Input Assembly)								
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0						Running1		Faulted
1								
2	Speed Actual RPM (Low Byte)							
3	Speed Actual RPM (High Byte)							

To make your programming easier, use advanced mapping to re-map the value to its own memory location. For more information, see Map the Memory Location with Advanced Mapping on page 183.

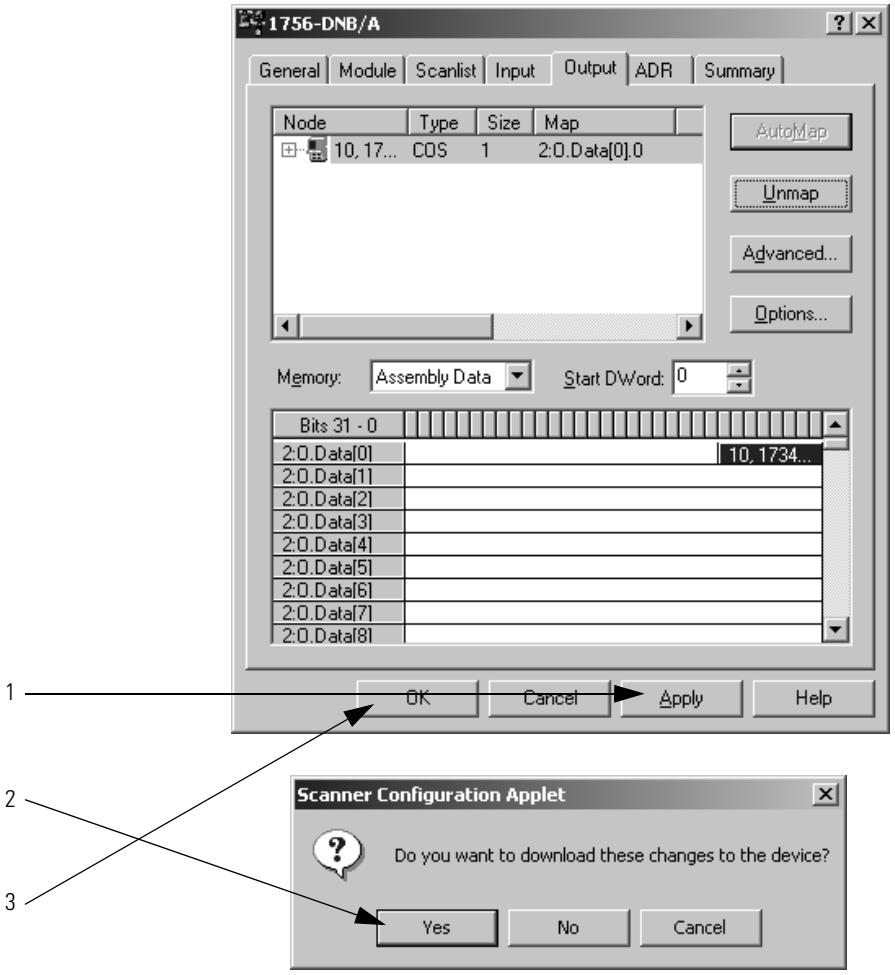
Download the Configuration to the Scanner

IMPORTANT Make sure the scanner is in Idle mode. Complete one of the following tasks to put the scanner in Idle mode:

- Turn off the …O.CommandRegister.Run bit of the scanner.
- Place the controller in program/remote program mode.

Complete the following steps to download configuration to the scanner.

1. Apply the changes.
2. When the Scanner Configuration Applet warning appears, click Yes to download the changes to the device.
3. Click OK.

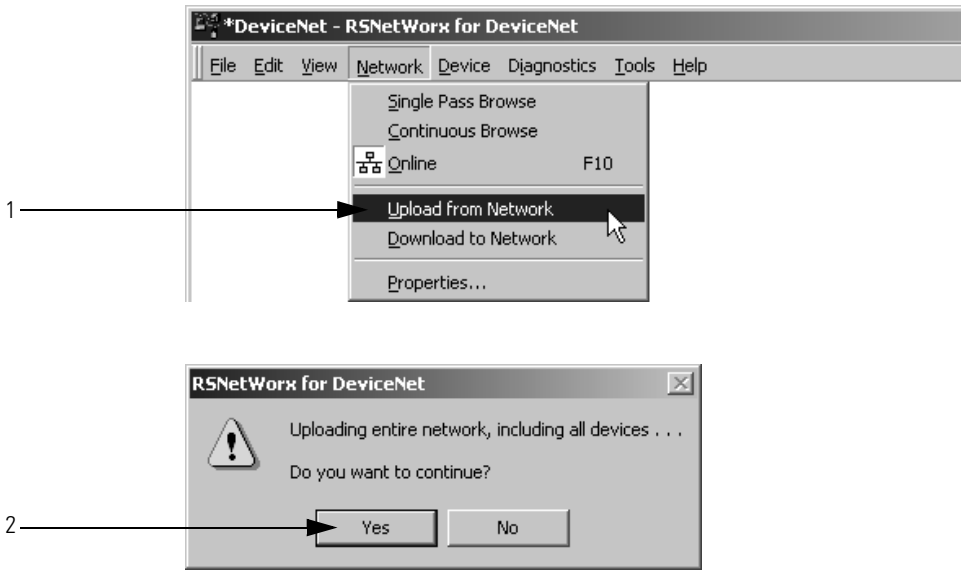


Upload and Save the Configuration File

Once you finish configuring the devices on the network, upload the entire network and save the file. This stores the configuration of each device in an offline file.

Complete the following steps to upload and save the configuration file.

1. From the File menu in RSNetWorx for DeviceNet software, choose Upload from Network.
2. When the warning appears, click Yes to upload the entire network.
3. Save the file.



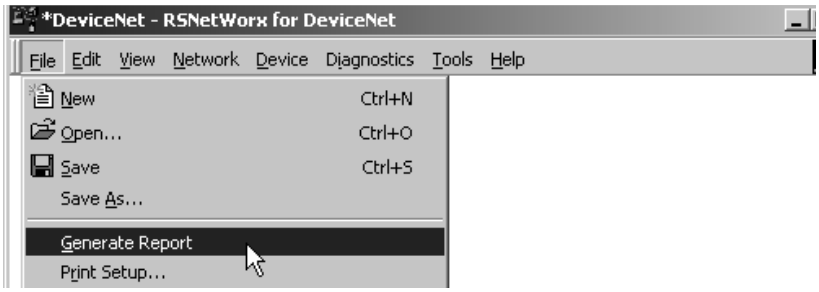
Generate an RSNetWorx for DeviceNet Report

An RSNetWorx for DeviceNet software report shows these items:

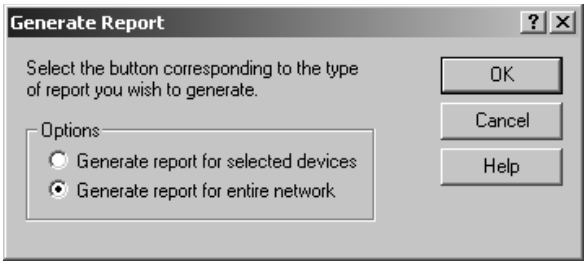
- Devices on the network
- Memory addresses of devices in the scanner
- Device configurations

The report is a useful reference when you program your system. Complete the following steps to generate a report.

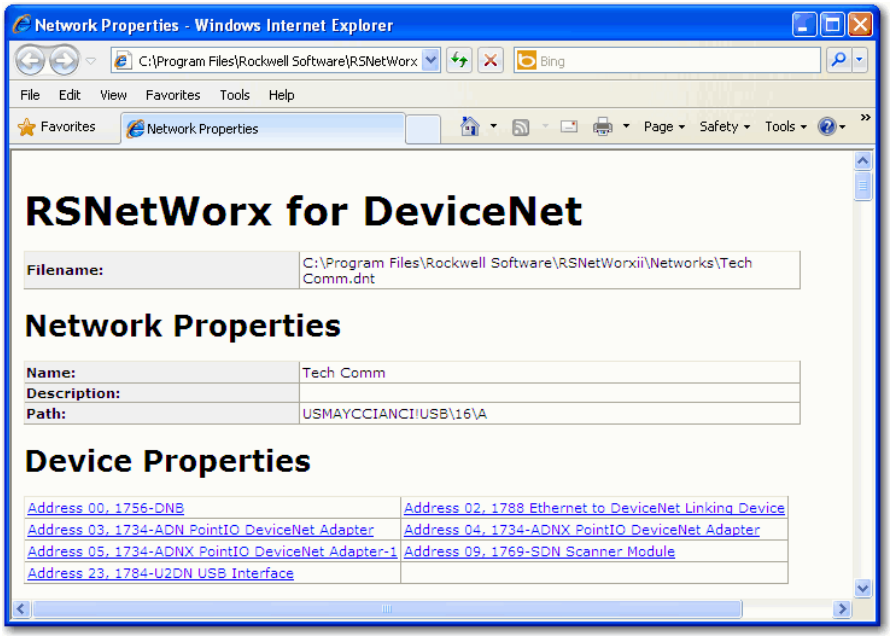
1. From the File menu in RSNetWorx for DeviceNet software, choose Generate Report.



2. Click Generate report for entire network and click OK.



The report appears in your web browser.



Notes:

Automatically Configure a DeviceNet Network

This chapter provides a quick method for configuring a DeviceNet network. It uses the AutoScan feature to establish communication between the controller and the devices on the DeviceNet network with minimal steps.

Topic	Page
How AutoScan Operates	80
Determine If You Can Use AutoScan	82
How AutoScan Affects Your Network	83
Install the DeviceNet Node Commissioning Tool	84
Connect Devices to the Network	84
Add the Scanner to the RSLogix 5000 Project	89
Enable AutoScan with RSLogix 5000 Software	91
Access Device Data	99
Put the Scanner in Run Mode	100
Additional Information About AutoScan	101

The DeviceNet AutoScan feature enables a scanner to automatically map a network of slave devices into its scan list without the use of RSNetWorx for DeviceNet software. This greatly improves the ease of setting up a DeviceNet network, especially networks comprised of simple devices.

When the feature is enabled, a DeviceNet scanner continuously searches for devices on the network. Once a qualifying slave device is found, it is added to the scanner's scan list and its I/O data is mapped into a predefined location in the scanner's I/O memory table based on the device's node address.

How AutoScan Operates

IMPORTANT AutoScan works only with 1756-DNB and 1769-SDN modules in Logix controller applications.

AutoScan is active when the feature is enabled and the scanner is in Idle mode. When active, the scanner attempts to connect to each device not enabled in the scan list. The scanner only checks for devices with node addresses between 0 and 61, inclusive. The connections to these devices are made on a round-robin basis.

When a device is found, the scanner gets the produced and consumed data sizes from the slave device's Connection Object instances.

- If the produced data size is greater than the configured I/O allocation size, the device is added to the scan list with a produced size set equal to the I/O allocation size.

  When this happens, an I/O connection is made with the device, but an error occurs and error code #77 appears on the 1769-SDN for the device's node number.

- If the consumed data size is greater than the configured I/O allocation size, then the node is rejected and not entered into the scan list.

However, you can change the I/O allocation size, as described in Configure I/O Allocation Size Via the User Program, to accommodate the device with the largest produced and consumed data sizes in your scan list.

For qualifying nodes, the scanner enters the device into the scan list and attempts to allocate an I/O connection using one of the following communication format choices in this particular order:

- Change Of State (COS) EPR = 250ms
- Poll EPR = 75ms
- Strobe EPR = 75ms
- Cyclic EPR = 500ms

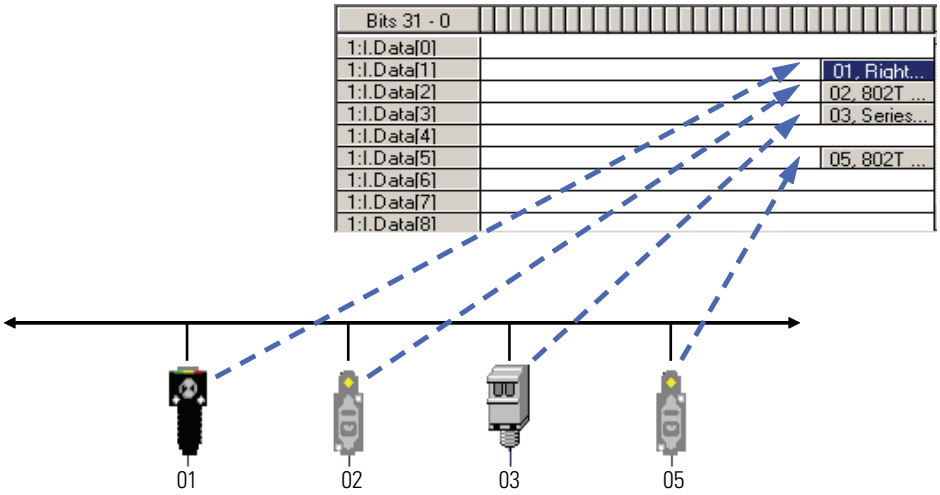
EXAMPLE If a photoeye is connected on a network that only supported strobed connections, the scanner executes the following tasks:

- The scanner recognizes that a device exists for which memory is available for the node number with the configured allocation size on a network that is not currently mapped.
- The scanner attempts to initiate both COS and polled connections first, but the strobed connection is selected as that is the only connection that the photoeye supported.

The input and output data is mapped into the scanner's I/O data table based on the device's node address and the configured fixed mapping size. The DINT-based formula that is used with the CompactLogix controller for calculating the input or output data location is as follows:

Input (Output) Offset = [(Node Address) x (Allocation Size)] / 4

EXAMPLE When using the default fixed mapping size of 4 bytes, the input data for the devices shown in the example below is allocated in the 1769-SDN's input table as shown below. Notice node 1 is in the data map at DINT location 1, node 2 at DINT location 2, and so on.



Notice that, in this example, node 4 is unused. However, the I/O memory slot remains allocated for it.

IMPORTANT If you are using a MicroLogix 1500 controller with a 1769-SDN scanner, you must use the following WORD-based formula for calculating the input or output data location:

Input (Output) Offset = ([(Node Address) x (Allocation Size)] / 2) + Data Offset

In this formula the Data Offset = 66 for Input Offset and 2 for Output Offset.

The data offset value is used to account for scanners that have a fixed status field at the start of the input or output data, such as the 1769-SDN scanner.

Determine If You Can Use AutoScan

Make sure your network meets these requirements to use this chapter:

- You have completed all the tasks required to do the following:
  - Connect a computer and devices to the network.
  - Create a network configuration file.
  - Go online.
  - Download the configuration file to the network.

  Refer to Chapter 2 through Chapter 5 to complete the tasks listed above.

- Your DeviceNet scanner must support the AutoScan feature. For more information, refer to your firmware release notes.

- Your application uses RSLogix 5000 programming software, version 13 or later.

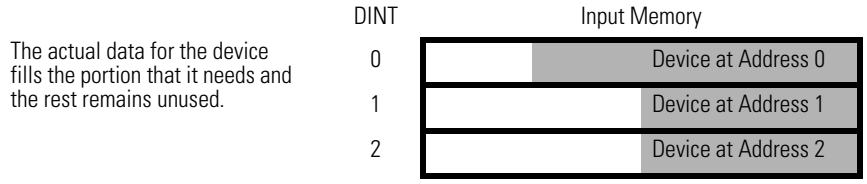
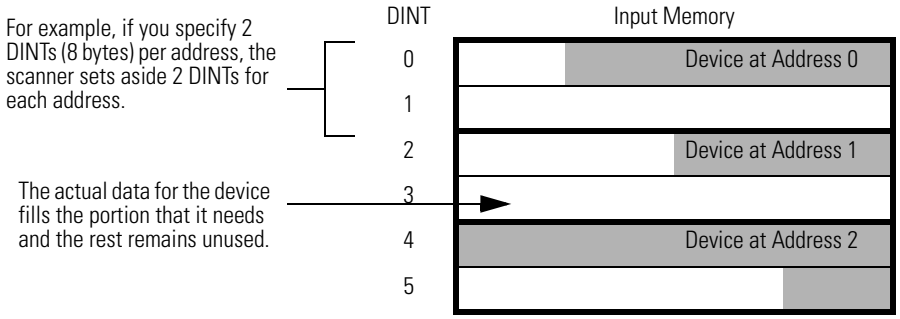
- The scanner's I/O allocation size is configured to accommodate the input and output data sizes of all devices on your DeviceNet network.

  The default AutoScan setting allocates a 4-byte entry in both the input and output memory maps in the scanner for each slave device detected on the network. This default size is chosen to accommodate the default Logix native data size of 32 bits, that is a DINT.

  If you use a device that sends more than 4 bytes of input or output data, such as an E3 Solid State Overload Relay (catalog number 193-EC*xx*), you must change the I/O allocation size.

How AutoScan Affects Your Network

As you use AutoScan, keep in mind the considerations described in the following table.

Consideration	Description
AutoScan clears the current configuration.	With AutoScan, the scanner automatically sets up communication with the devices on your DeviceNet network. When you turn on the AutoScan option, the scanner removes any previous configuration that was done to the scanner.
AutoScan allocates a fixed memory size for each device.	At its default setting, AutoScan allocates 1 DINT of input memory and 1 DINT of output memory for each device on the DeviceNet network. 
The bytes/node value defines how much memory for each address.	AutoScan lets you specify how much input and output memory to give to each address on your network. 
New devices are automatically available.	While the scanner is in Idle mode, AutoScan continues to establish communication with devices that you connect to the network, as long as the devices use input data and output data sizes that fit in the scanner's I/O allocation size.
The Automatic Device Recovery (ADR) option is not available.	You have to use RSNetWorx for DeviceNet software to edit the configuration of the scanner to use the Automatic Device Recovery (ADR) option of a DeviceNet scanner. This turns off AutoScan.

Install the DeviceNet Node Commissioning Tool

Use the DeviceNet node commissioning tool to set a device's node address and baud rate when that device does not have a hardware mechanism to do so.

You can skip this step if either of the following conditions apply:

- All your devices have hardware mechanisms to set a node address and baud rate. In this case, you do not need the tool.
- You already have the tool installed.

Follow these steps to install the node commissioning tool.

1. On the RSLogix 5000 software CD, find the following folder where language is the language of your software:

   language\Tools\Node Commissioning Tool

   For example, for software in English, open the ENU folder.
2. Follow the instructions in the readmefirst file.

Connect Devices to the Network

When you use the AutoScan functionality, you should do the following:

- Install and configure the scanner and any network interface devices on the network first.
- Install other devices on the network once the scanner and network interface devices are on the network.

Install a Scanner or Network Interface Devices

Complete the following steps to install a scanner or network interface device on the DeviceNet network.

1. Connect the scanner and any network interface devices to the network.
2. Set a node address for the scanner and any network interface devices.

   Out of the box, a DeviceNet device is preset for node address 63. To avoid address conflicts, connect and configure the devices one at a time. Otherwise, the address conflicts may prevent communication.

The following addresses are recommended but not required.

Give this address	To this device
0	Scanner.
1…61	Your devices.
62	Computer interface to the network, such as a 1784-U2DN or 1788-PCIDS device.
63	Leave open. Out of the box, a DeviceNet communication module is preset for address 63. Leaving address 63 open lets you get a new device on the network without conflicting with another device.

- Refer to Set the Node Address of a Device on page 30 for more information on several options you can use to set the node address.
- Refer to Set the Node Address and Baud Rate with the DeviceNet Node Commissioning Tool on page 87 for more information on how to use just the DeviceNet node commissioning tool.

3. Set a baud rate for the scanner and any network interface devices.

   When setting baud rates, consider the following:

   - If you set the baud rate on the scanner or network interface device before you install other devices on the network, you reduce the number of baud rate errors.
   - Scanners and network interface devices use a fixed baud rate.
   - Sensors and similar DeviceNet communication modules use autobaud to set their baud rate. They wait for another device to communicate. Then they set their baud rate to the same baud rate as the other device.
   - By first placing a scanner or network interface device on the network, the other device has a network baud rate against which to set its baud rate.
   - Initially, leave the baud rate of the scanner and network interface at the default setting of 125KBps. If you want to change the baud rate, wait until after you establish communication with all your devices at the default setting (125K).
   - Refer to Set the Node Address and Baud Rate with the DeviceNet Node Commissioning Tool on page 87 for more information.

Install Other DeviceNet Devices

Complete the following steps to install other devices on the DeviceNet network.

1. Connect the rest of your devices to the network one at a time.
2. Set a node address for each device after you add it to the network.

   Out of the box, a DeviceNet device is preset for node address 63. To avoid address conflicts, connect and configure the devices one at a time. Otherwise, the address conflicts may prevent communication.

   The following addresses are recommended but not required.

Give this address	To this device
0	Scanner
1…61	Your devices
62	Computer interface to the network, such as a 1784-U2DN or 1788-PCIDS device
63	Leave open. Out of the box, a DeviceNet communication module is preset for address 63. Leaving address 63 open lets you get a new device on the network without conflicting with another device.

   - Refer to Set the Node Address of a Device on page 30 for more information on how to use any of several options to set the node address.
   - Refer to Set the Node Address and Baud Rate with the DeviceNet Node Commissioning Tool on page 87 for more information on how to use the DeviceNet node commissioning tool.

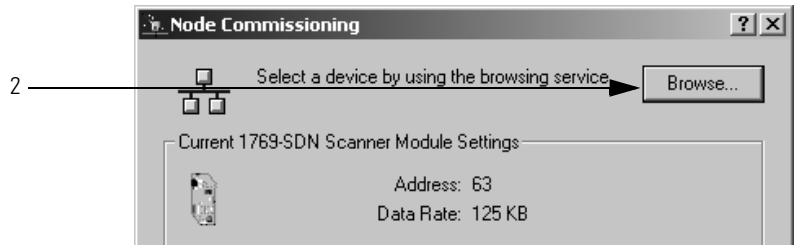
3. Set a baud rate for each device after you add it to the network.

   When setting baud rates, consider the following:
   - Sensors and similar DeviceNet communication modules use autobaud to set their baud rate. They wait for another device to communicate. Then they set their baud rate to the same baud rate as the other device.
   - If a device has a hardware mechanism to set its baud rate, set it to autobaud, if available. Otherwise, set the device to the baud rate of the network.
   - After you change the address or baud rate of a device via a switch, cycle power to the device.
   - If a device has no hardware mechanism to set its address or baud rate, Refer to Set the Node Address and Baud Rate with the DeviceNet Node Commissioning Tool on page 87.
   - After you set the address of a device, check its network status indicator. Typically, a solid red indicator signifies an address conflict or problem with the baud rate.

Set the Node Address and Baud Rate with the DeviceNet Node Commissioning Tool

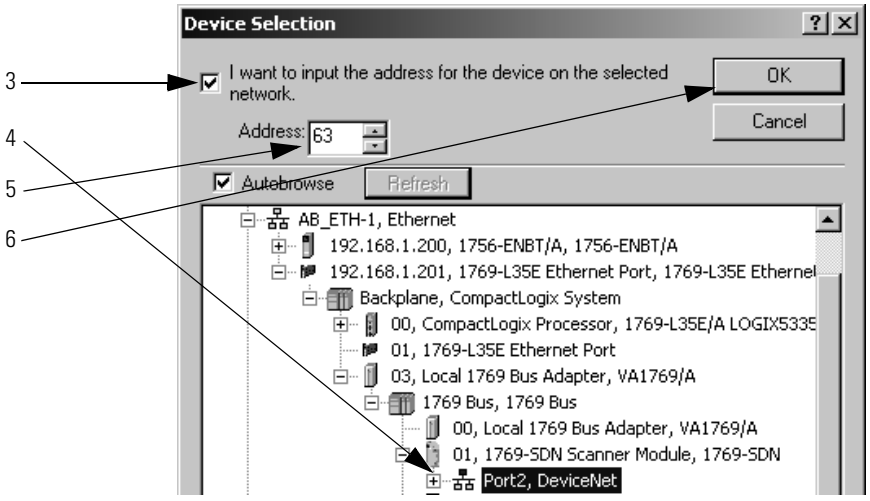
Complete the following steps to set a node address and baud rate with the DeviceNet node commissioning tool.

1. Start the node commissioning tool.
2. Click Browse.

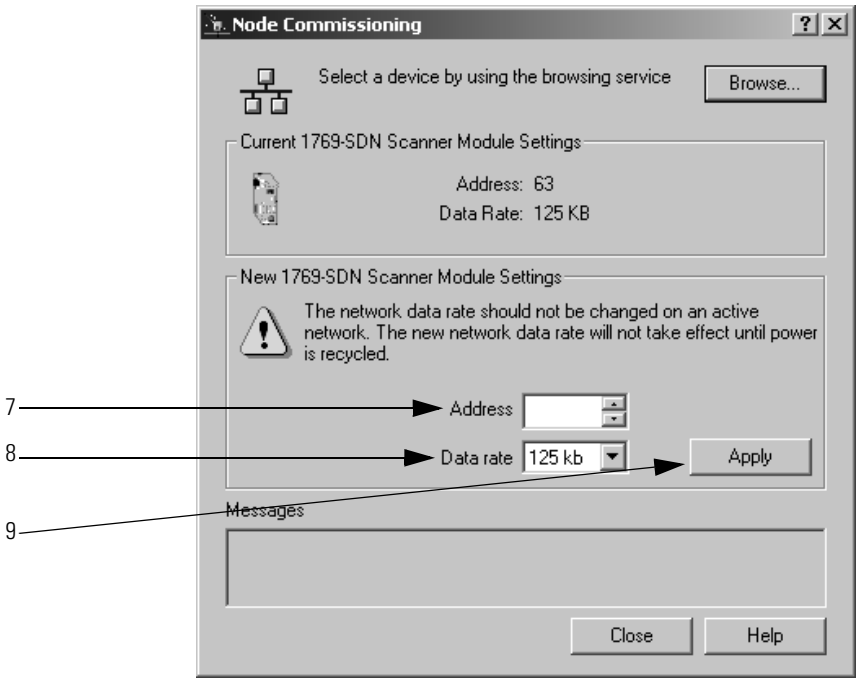


3. Check I want to input the address for the device on the selected network.
4. Select the DeviceNet network.
5. Enter the current address for the device.

   Out of the box, a device uses address 63.
6. Click OK.



7. Enter the new address for the device.
8. Choose the baud rate for the device.
9. Click Apply.

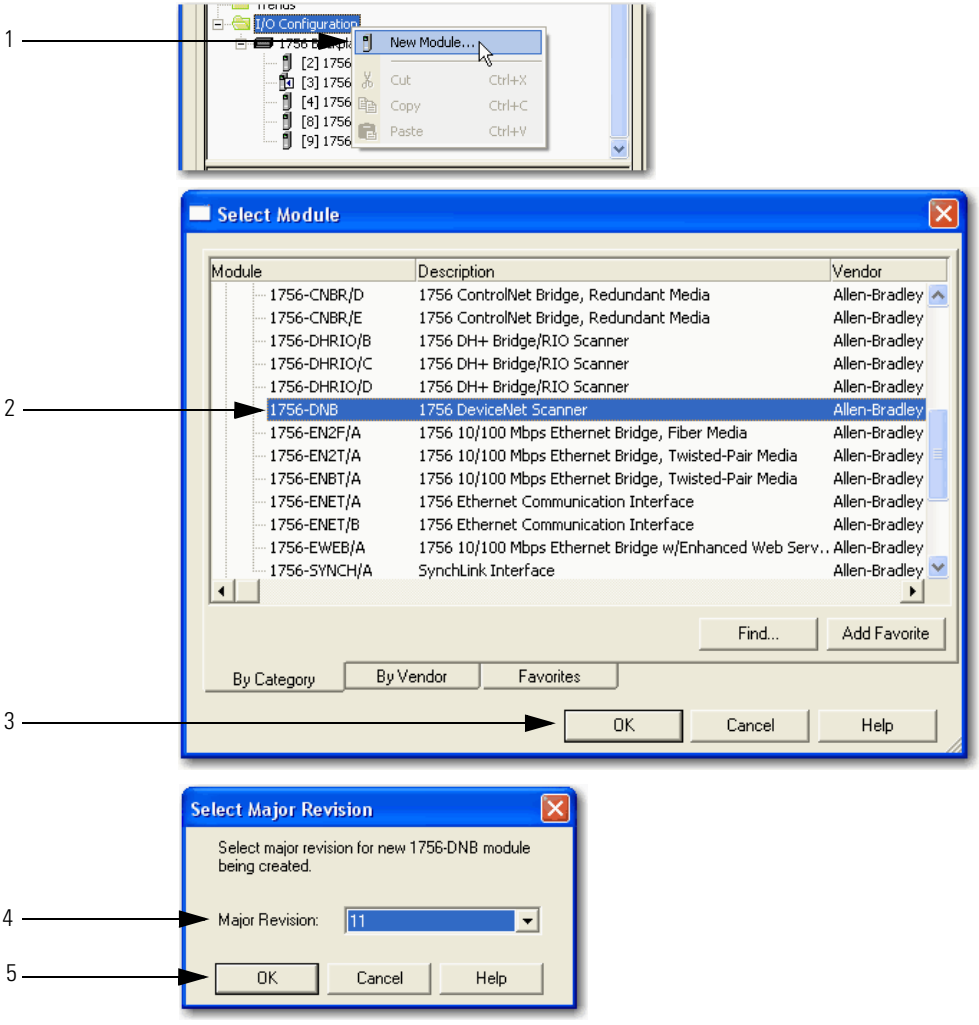


Add the Scanner to the RSLogix 5000 Project

To access the data of the network, add the scanner to the I/O configuration of the controller.

Add the Scanner to the I/O Configuration Folder

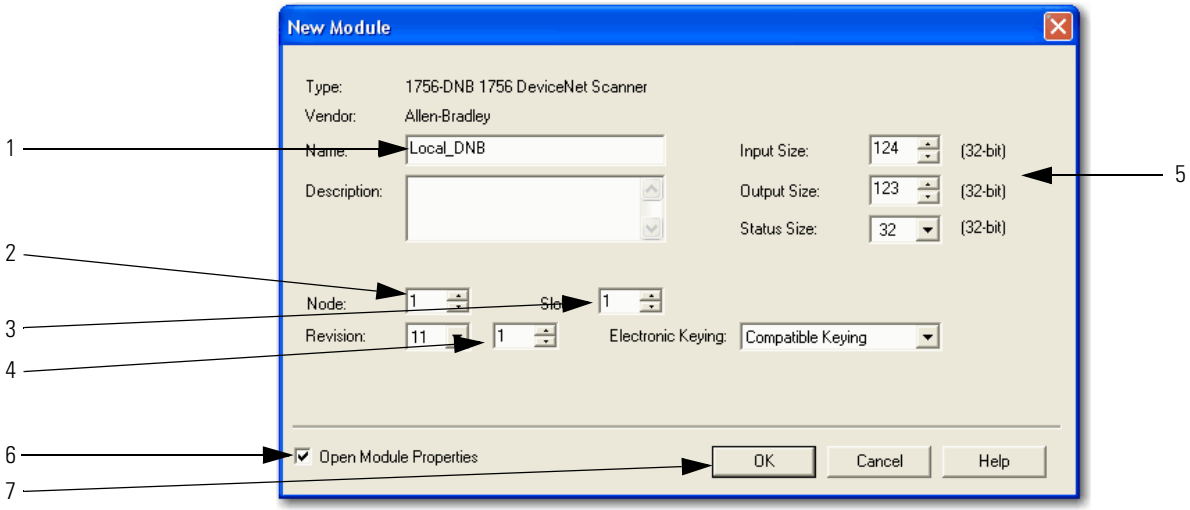
1. Right-click the I/O Configuration folder and choose New Module.
2. Select the type of scanner.
3. Click OK.
4. From the Major Revision pull-down menu, choose a scanner revision number.
5. Click OK.



Define the Properties of the Scanner

1. Type a name for the scanner.
2. Enter the scanner node number.
3. Enter the scanner slot number.
4. Enter the scanner minor revision.
5. Enter the size of the input and output memory maps that the scanner will allocate for each device it detects on the network.

   Valid values range from 0...32 bytes per node.
6. If you need to make additional configuration changes, such as setting the Requested Packet Interval (RPI), check Open Module Properties.
7. Click OK.



8. If the Module Properties dialog box appears, make any additional configuration changes.

Enable AutoScan with RSLogix 5000 Software

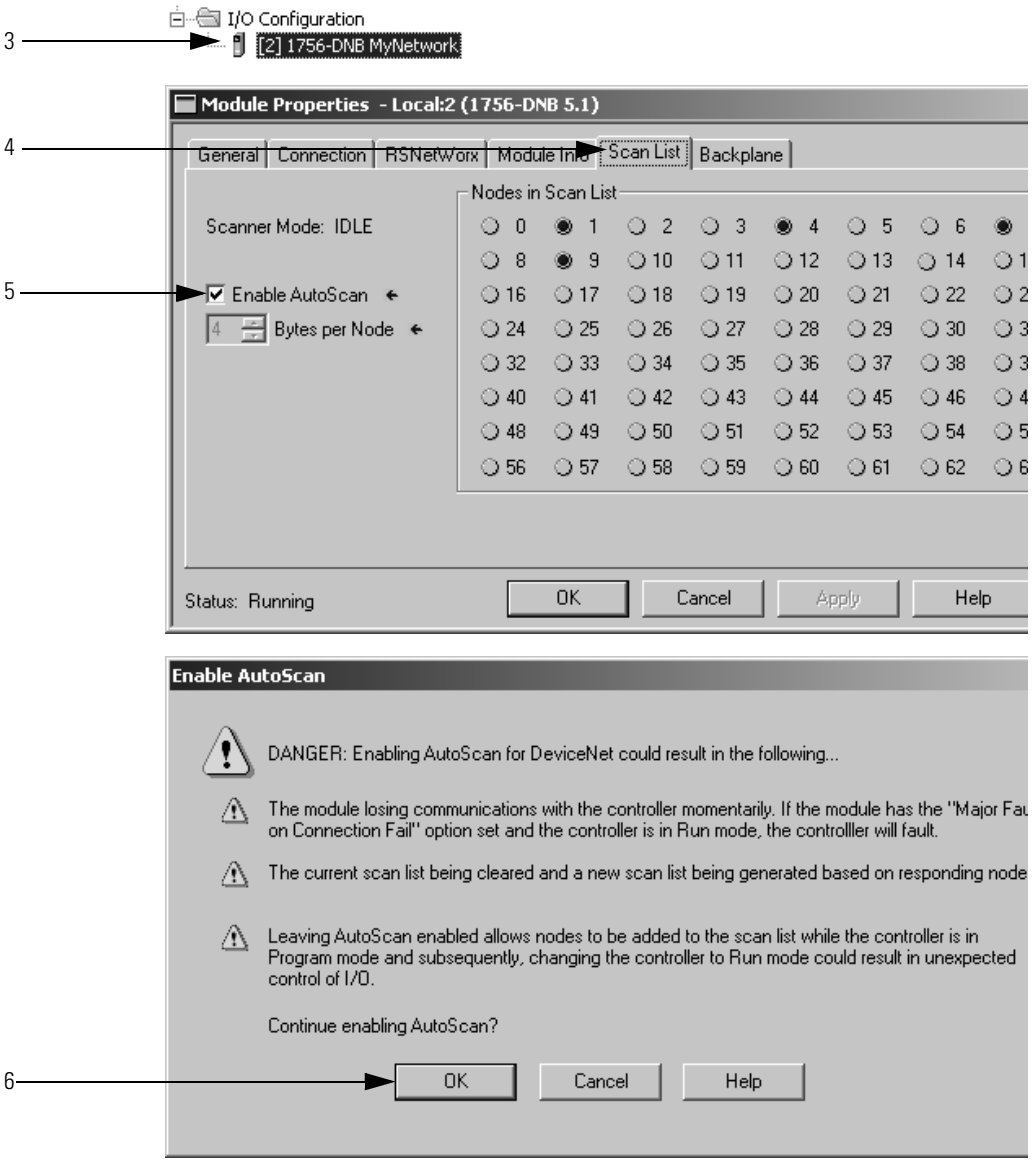
To enable AutoScan with RSLogix 5000 software, follow these steps.

1. Save changes to your RSLogix 5000 project.
2. Download the project to the Logix5000 controller.

IMPORTANT	In the following steps, you clear any existing configuration from the scanner and reconfigure it to communicate with the devices on the network. In the controller, this may change the tag addresses of the devices. If you have already programmed your logic, make sure that it still addresses the correct data.

3. Double-click the scanner in the Controller Organizer to access its properties.
4. Click the Scan List tab.

   A blue dot in the Nodes in Scan List section indicates a device that the scanner now controls.
5. Check Enable AutoScan.
6. When the Enable AutoScan warning appears, click OK.


3
I/O Configuration
[2] 1756-DNB MyNetwork
4
Module Properties - Local:2 (1756-DNB 5.1)
General
Connection
RSNetWorx
Module Info
Scan List
Backplane
Nodes in Scan List
Scanner Mode: IDLE
5
Enable AutoScan
Bytes per Node
Status: Running
OK
Cancel
Apply
Help
Enable AutoScan
DANGER: Enabling AutoScan for DeviceNet could result in the following...
The module losing communications with the controller momentarily. If the module has the "Major Fau
on Connection Fail" option set and the controller is in Run mode, the controlller will fault.
The current scan list being cleared and a new scan list being generated based on responding node
Leaving AutoScan enabled allows nodes to be added to the scan list while the controller is in
Program mode and subsequently, changing the controller to Run mode could result in unexpected
control of I/O.
Continue enabling AutoScan?
6
OK
Cancel
Help

Initiate AutoScan via the User Program

The DeviceNet AutoScan feature enables a scanner to automatically map a network of slave devices into its scan list without the use of RSNetWorx for DeviceNet software. This greatly improves the ease of setting up a DeviceNet network, especially networks comprised of simple devices.

When the feature is enabled, a DeviceNet scanner continuously searches for devices on the network. Once a qualifying slave device is found, it is added to the scanner's scan list and, based on the device's node address, its I/O data is mapped into a predefined location in the scanner's I/O memory table.

Implementing AutoScan

To implement this feature, make sure that the appropriate version of DeviceNet scanner is used. See page 97 for the list of compatible products supporting this feature.

This section describes how to set up the feature and how it operates. Notice that explicit messaging is used for some of the steps. An explicit message can be sent on a DeviceNet network in the following ways:

- A user ladder program
- External programming/configuration devices, such as the hand-held DeviceNet Configuration Terminal, catalog number 193-DNCT
- RSNetWorx for DeviceNet software

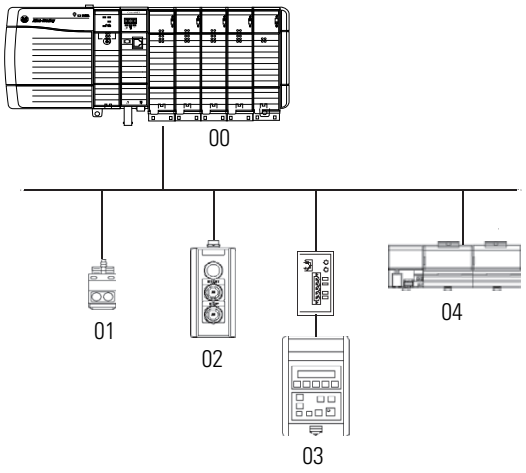
Since the purpose of the feature is to eliminate the use of RSNetWorx for DeviceNet software, instructions on how to send an explicit message via the class instance editor in the software are not covered in this document.

To implement the feature, follow these steps.

1. Set up the physical network.

   Make sure all devices are addressed appropriately. For example, be sure there are no address conflicts and devices are communicating at the same baud rate.

   The diagram below shows an example system using the 1756-DNB scanner.



   You can commission the node addresses via hardware switches on the devices or through other DeviceNet configurators, such as the hand-held DeviceNet Configuration Terminal. For more information on how to set up the DeviceNet Configuration Terminal's node address, see the DeviceNet Configuration Terminal User Manual, publication 193-UM009A-EN-P.

2. Set up I/O allocation size in the scanner.

   TIP This step is optional.

   The default AutoScan setting allocates a 4-byte entry in both the input and output memory maps in the scanner for each slave device detected on the network. This default size is chosen to accommodate the default Logix native data size of 32 bits (DINT). If that is adequate for the application, go to step 3.

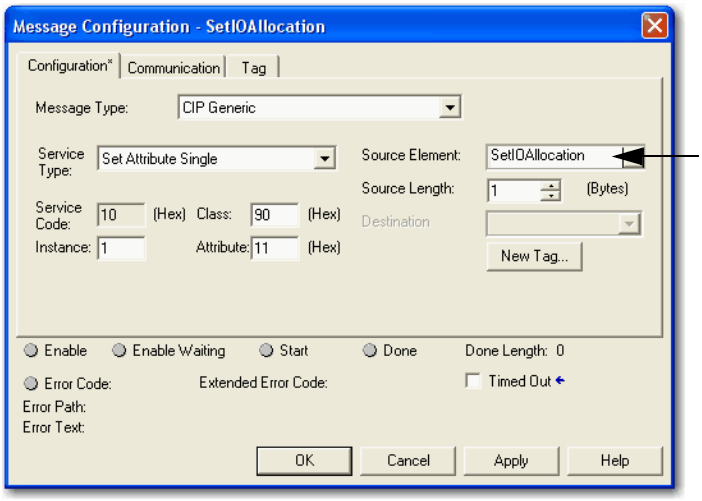
   For applications where you want to customize the I/O allocation size, the 4-byte allocation can be adjusted through an explicit message to the scanner using the SetAttributeSingle service. The entry allocation can be configured for 1 to 32 bytes per node.

   Configure the allocation size using one of these methods:

   - Configure I/O Allocation Size Via the User Program
   - Configure I/O Allocation Via a DeviceView Configurator

Configure I/O Allocation Size Via the User Program

Use the parameters shown in the Message Configuration dialog box below to adjust the I/O allocation size. Make sure that the message is sent to the appropriate DeviceNet scanner.



This data tag should be configured as an SINT, and should contain the value of the desired per-node fixed mapping size (1 - 32).

Configure I/O Allocation Via a DeviceView Configurator

Rockwell Automation offers the hand-held DeviceNet Configuration Terminal, catalog number 193-DNCT, to configure individual devices on a DeviceNet network.

To configure the I/O allocation size, attach a configurator device on the network and send an explicit message to the scanner by using the parameters below. Send the desired allocation size (1...32 bytes) to the attribute below to configure the per-node I/O allocation.

Field	Value
Service Code	10 Hex
Class	90 Hex
Instance	1
Attribute	11 Hex

For more information on how to use the DeviceNet Configuration Terminal, refer to these publications:

- 193-DNCT DeviceNet Configuration Terminal Quick Reference, publication 193-QR002A-EN-P
- DeviceNet Programming Terminal User Manual, publication 193-UM009A-EN-P

IMPORTANT You can change the I/O allocation size only when the scanner is in Idle mode, and the AutoScan feature is disabled.

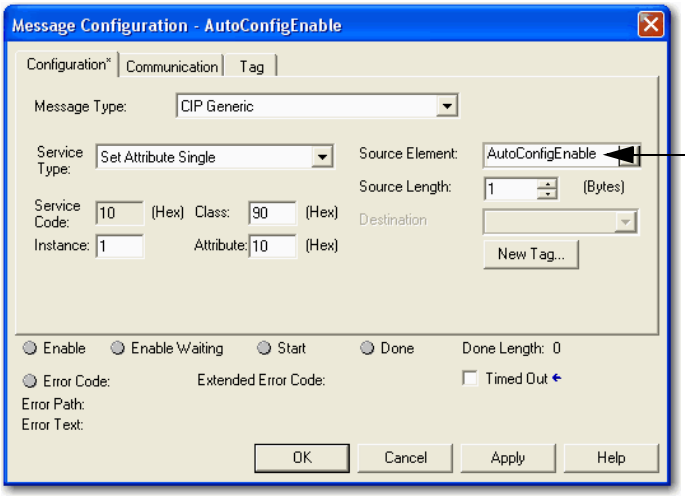
3. Enable AutoScan.

   This is accomplished by executing an explicit message to the scanner by using the SetAttributeSingle service. As mentioned before, there are multiple ways to send an explicit message on DeviceNet, including the following:

   - Initiate AutoScan Via the User Program
   - Initiate AutoScan via the DeviceView Configurator

Initiate AutoScan Via the User Program

To enable AutoScan by using the MSG instruction, use the parameters shown below and make sure that the message is sent to the appropriate DeviceNet scanner. The figure shown below is from RSLogix 5000 software. Refer to the appropriate user manuals to determine how to perform explicit messaging in other PLC platforms.



This data tag should be configured as a SINT. Upon execution of the MSG, AutoScan is:
Enabled if tag = 1
Disabled if tag = 0

Initiate AutoScan via the DeviceView Configurator

To enable AutoScan by using a DeviceNet configurator, attach the device on the network and send an explicit message to the scanner using the parameters below. Send a 1 to that attribute to enable the feature, and 0 to disable.

Field	Value
Service Code	10 Hex
Class	90 Hex
Instance	1
Attribute	11 Hex

For more information on how to use the DeviceNet Configuration Terminal, refer to these publications:

- 193-DNCT DeviceNet Configuration Terminal Quick Reference, publication 193-QR002A-EN-P
- DeviceNet Programming Terminal User Manual, publication 193-UM009A-EN-P.

IMPORTANT You can change the I/O allocation size only when the scanner is in Idle mode, and the AutoScan feature is disabled.

Once the feature is enabled, the scanner scans the network to populate and configure the scan list automatically.

4. Put scanner in RUN mode to begin system operation.

Additional Considerations Regarding AutoScan

The factory default setting for AutoScan is disabled for all products.

Make sure that input or output data memory size in the scanner is large enough to accommodate the size required based on the number of nodes on the network and the AutoScan I/O allocation size per node.

EXAMPLE If the I/O allocation size per node is configured for 16 bytes and there are 32 slave devices on the network (node addresses 1…32), AutoScan requires 16 bytes x 32 = 512 bytes (128 DINT) of I/O space in both the scanner's input and output table. Assuming it is a ControlLogix system, the maximum scanner input data table size is 124 DINT and 123 DINT for output. The required space exceeds what the 1756-DNB can support. You would need to adjust the I/O allocation size or reduce the slave device count on the network to include all of the devices in the scan list.

ATTENTION: Devices outside of the scanner's allowable I/O image space will be rejected and will not be included in the scan list.

The AutoScan feature is automatically disabled in the scanner as soon as a scanner property is modified by RSNetWorx for DeviceNet software. For example, any manual changes to the scan list using RSNetWorx for DeviceNet software disables the AutoScan feature in the scanner.

One new status code has been added to the Node Status list. This code is presented in the Node Status Table.

Status Code (Decimal)	Description of Status
65	AutoScan Active (Scanner only status)

When the scanner is in Run mode with AutoScan enabled, the scanner display alternates between 65 and the scanner node address.

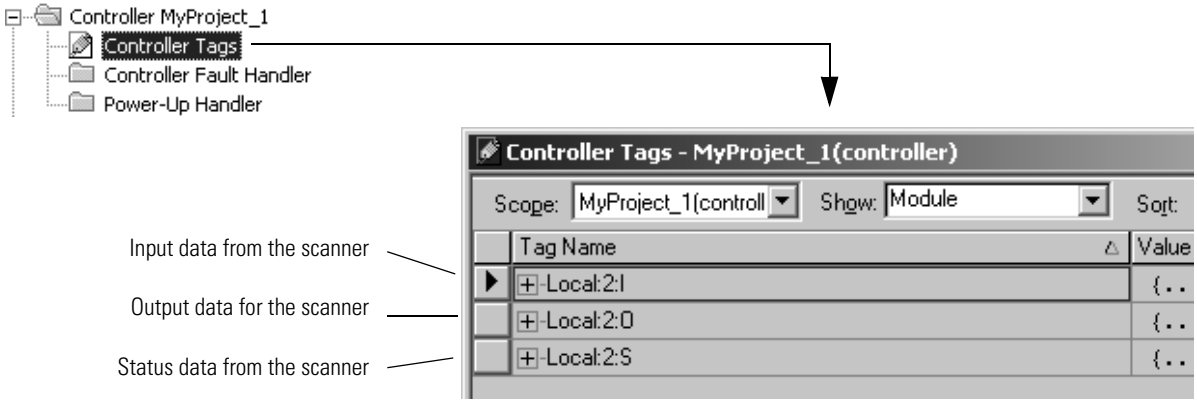
When a scanner is transitioned from Run mode to Idle mode while AutoScan is enabled, it only scans the network for nodes that are not already in the scan list. However, while in Idle mode, an AutoScan DISABLE to ENABLE transition causes the scanner to erase the existing scan list and scan for all nodes on the network.

The AutoScan feature enables AAR (Auto-Address Recovery) for each of the configured slave devices.

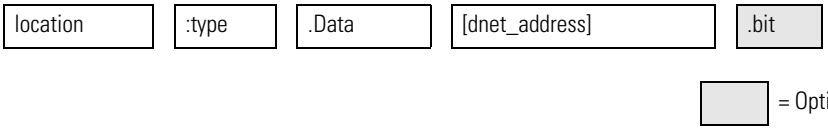
The AutoScan feature checks for the Quick Connect setting in each slave device and enables Quick Connect in the scanner if it is enabled in the slave devices.

Access Device Data

When you add the scanner to the I/O configuration of the controller, RSLogix 5000 software automatically creates a set of tags for the input, output, and status data of the network.



The tags for your DeviceNet data follow this format.



Where	**Is**		
location	location of the scanner in the system		
	If you have this scanner	**In a**	**Then location is**
	ControlLogix 1756-DNB	local chassis	Local:slot_number_of_scanner
		remote chassis	adapter:slot_number_of_scanner where: adapter is the name of the EtherNet/IP or ControlNet module in the remote chassis.
type	type of data:		
	Where	**Is**	
	input from a device	I	
	output to a device	O	
dnet_address	address of the device on the DeviceNet network (based on only 4 bytes per node)		
bit	specific bit within the data of the device		

While you can use the input and output tags of the scanner directly in your logic, it is a lot easier to use alias tags. Alias tags can be used whether you use AutoScan or not to configure the scanner.

Put the Scanner in Run Mode

To run the DeviceNet network, follow these steps.

1. Place the controller in Run or Remote Run mode.
2. Set the following bit of the output structure for the scanner.

To put the scanner in Run mode, turn on this bit. →

If you want to	The set this bit	To
Run the network	…O.CommandRegister.Run	1
Not run the network (Idle mode)	…O.CommandRegister.Run	0
Fault the network	…O.CommandRegister.Fault	1
Not fault the network	…O.CommandRegister.Fault	0
Disable the network	…O.CommandRegister.DisableNetwork	1
Enable the network	…O.CommandRegister.DisableNetwork	0
Halt the scanner (ceases all operation)	…O.CommandRegister.HaltScanner	1
Unhalt the scanner	…O.CommandRegister.HaltScanner	0
Reset the scanner	…O.CommandRegister.Reset	1
Resume operation after a reset	…O.CommandRegister.Reset	0

3. Check the scanner for Run mode.

If you have this scanner	Then this indicator	Displays
ControlLogix 1756-DNB	4-character display	RUN
CompactLogix 1769-SDN	2-character display	its node number when in Run mode

Additional Information About AutoScan

Type of Connection that the Scanner Sets Up

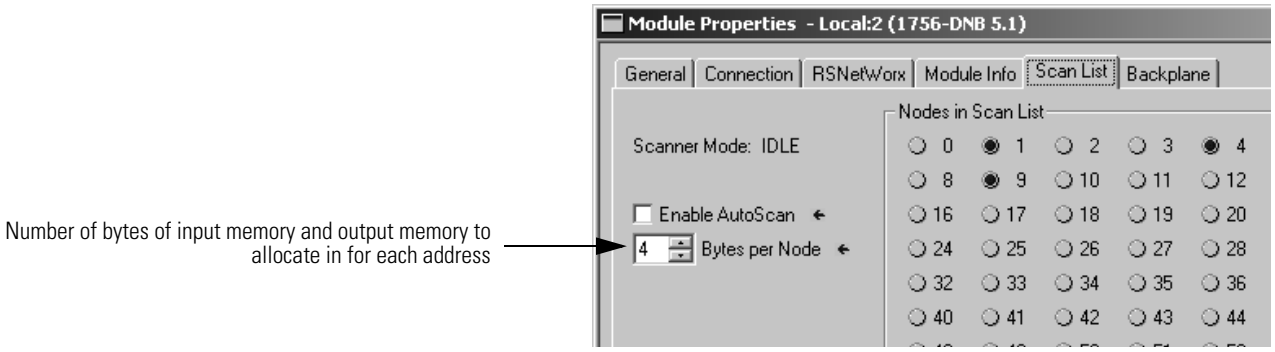
The type of update (connection) that the scanner sets up with each device depends on the device. The scanner chooses the first connection type that the device supports in this order:

1. Change-of-state (COS)
2. Polled
3. Strobed
4. Cyclic at 1000 ms

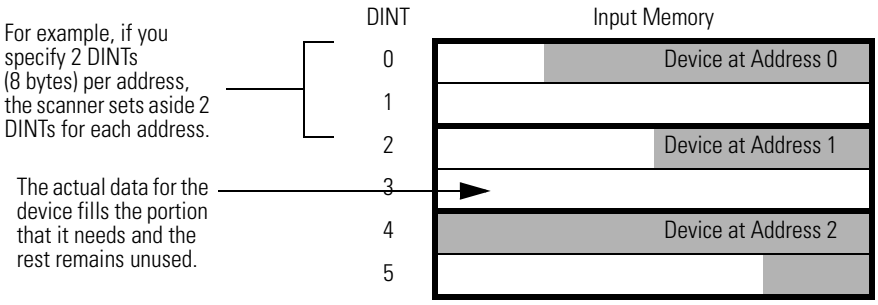
The scanner tries to set up a change-of-state connection. If the device does not support change-of-state, then the scanner tries to set up a polled connection and so on. The type of connection that the scanner sets up may not be the default for the device.

Allocating More Memory for Each Device

The AutoScan feature is easiest to use if you leave it set to 1 DINT (4 bytes) of input memory and output memory for each address.



As an option, you can allocate more memory for each device.

Consideration	Description
The bytes/node value defines the amount of memory for each address.	AutoScan lets you specify how much input and output memory to give to each address on the network. 
The scanner sets-up communication with any device that fits within the allocated memory size.	The scanner automatically sets up communication with those devices that fit within the memory allocated for each address. • For example, if you allocate 2 DINTs (8 bytes) per address, the scanner sets up communication with any device that sends or receives 1…8 bytes of data. • The scanner adds as many device as it can until it runs out of memory. • If you give too much memory to each address, you may not have enough memory for all your devices.
The scanner skips devices that are too large.	If a device needs more memory than is allocated, the scanner skips it and does not set up communication with it. For example, if you specify 2 DINTs (8 bytes) per address but a device sends 9 bytes, the scanner does not add the device to the scan list.
Manually editing the scan list turns off AutoScan.	If you use RSNetWorx for DeviceNet software to edit the configuration of the scanner, the scanner turns off AutoScan. Do not turn it back on or you will clear the configuration that you just entered. For example, if you use RSNetWorx for DeviceNet software to manually add a device to the scan list, the scanner turns off AutoScan. If turn on AutoScan again, the scanner clears it current configuration and starts over.

Control a Device

Use this chapter to develop the logic that examines and controls your devices.

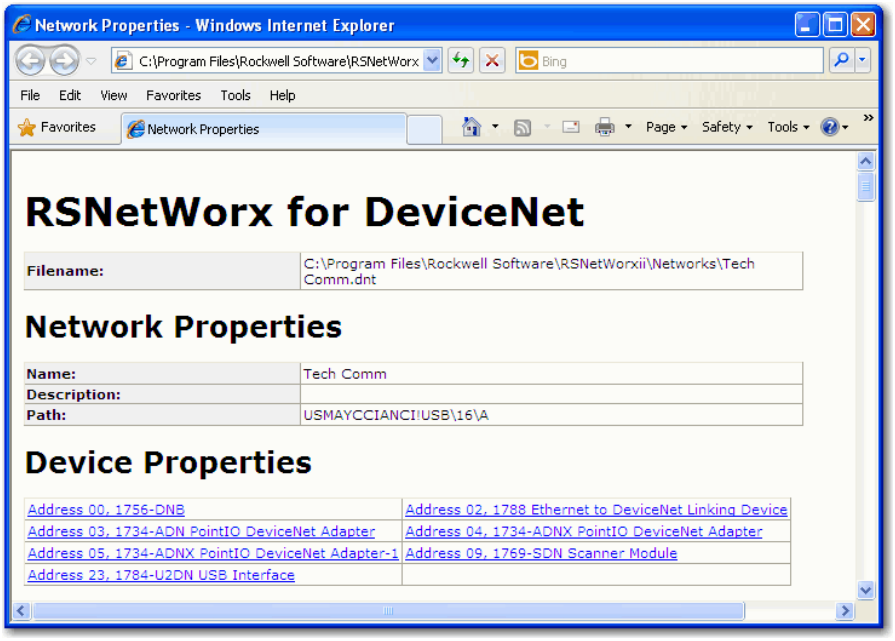
Topic	Page
Before You Begin	104
Determine the Address of DeviceNet Data	109
Determine If a Device Has Failed	112
Place the Scanner in Run Mode	113
When to Use a MSG Instruction	113
Determine the Parameter Number to Access	114
Determine the Configuration of the Parameter	114
Test the Parameter	116
Enter Message Logic	117

Before You Begin

Before you use this chapter, get the following information:

- RSNetWorx Report for the Network
- Data Map for Each of Your Devices

RSNetWorx Report for the Network



Data Map for Each of Your Devices

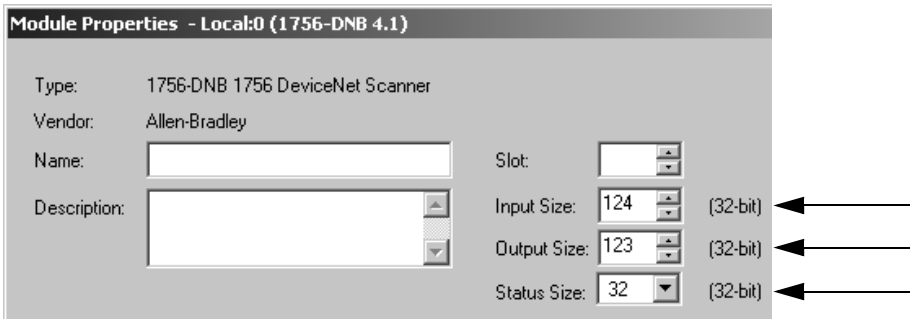
Instance 70 Data Format (Basic Speed Control Input Assembly)								
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0						Running1		Faulted
1								
2	Speed Actual RPM (Low Byte)							
3	Speed Actual RPM (High Byte)							

Add the Scanner to the Controller's I/O Configuration

To access the data of the network, add the scanner to the controller's I/O configuration in RSLogix 5000 programming software. However, you may need to conserve bandwidth on the EtherNet/IP or ControlNet network.

Conserve EtherNet/IP or ControlNet Network Bandwidth

The default configuration of the scanner gives you the maximum amount of input, output, and status data, as shown in the following graphic.



If the scanner communicates with the controller via an EtherNet/IP or ControlNet network and you need to conserve bandwidth over that network, consider reducing the input, output, or status sizes.

- Set the input and output sizes = the number of input and output DINTs in the scanner that actually store device data.
- If you are **not** going to use all the status information, set the status size to the minimum required.

EXAMPLE	If you want to use **only** the ASCII representation of scanner status/display, set the status size to 10. If you also want to read the status code of the scanner, set the status size to 11.

See Table 1 - Set the Status Size for a Scanner on page 106 for more information on how to change the status size of a scanner from the default values.

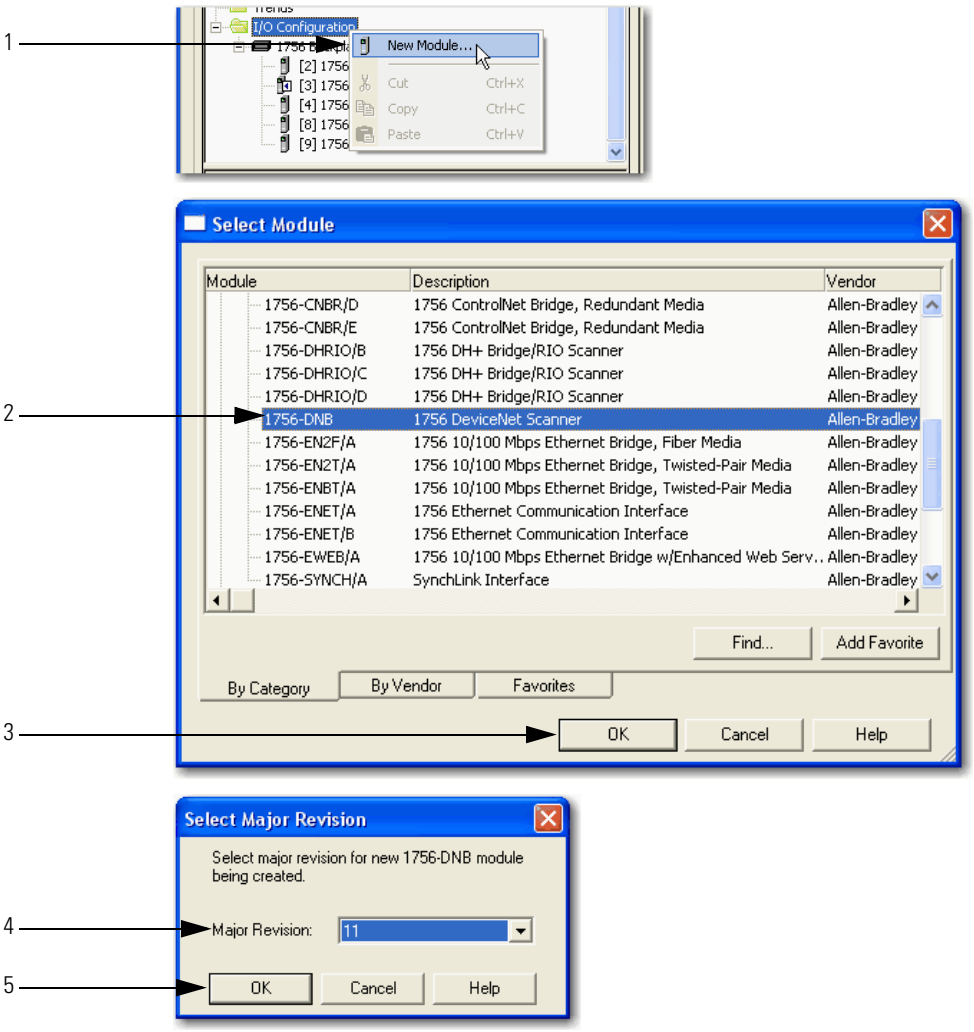
Table 1 - Set the Status Size for a Scanner

If you want the following information	Set the status size (DINTs) to the following value	This setting gives you the following parameter values.	
		Member	**Data Type**
Count of I/O scans	10	ScanCounter	DINT
Indication that a device has failed: • There is 1 bit for each address on the DeviceNet network (0 - 63). • The position of a bit = address of a device. • If a bit = 1, then the device at that address has failed.		DeviceFailureRegister	SINT[8]
Indication that the data size of a device does not match the amount of memory allocated for the device in the scanner: • There is 1 bit for each address on the DeviceNet network (0 - 63). • The position of a bit = address of a device. • If a bit = 1, then their is a mismatch with that address.		AutoverifyFailureRegister	SINT[8]
Indication that a device is idle: • There is 1 bit for each address on the DeviceNet network (0 - 63). • The position of a bit = address of a device. • If a bit = 1, then the device at that address is idle.		DeviceIdleRegister	SINT[8]
Indication that a device is online: • There is 1 bit for each address on the DeviceNet network (0 - 63). • The position of a bit = address of a device. • If a bit = 1, then the device at that address is online.		ActiveNodeRegister	SINT[8]
ASCII representation of scanner status/display		StatusDisplay	SINT[4]
Address of the scanner	11	ScannerAddress	SINT
Status code of scanner		ScannerStatus	SINT
Address with an error: • Scrolls through the addresses with errors • ScrollingDeviceStatus member shows the status code		ScrollingDeviceAddress	SINT
Status code of an address with an error: • Scrolls through addresses with errors • ScrollingDeviceAddress member shows the address		ScrollingDeviceStatus	SINT
Possible future expansion of the structure—5 DINTs	16		
Status code of lower 32 devices—1 byte per device	24	DeviceStatus	SINT[32]
Status code of all devices—1 byte per device	32	DeviceStatus	SINT[64]

Add the Scanner to the I/O Configuration Folder

Complete the following steps to add the scanner to the I/O configuration file.

1. Right-click and choose New Module.
2. Select the type of scanner.
3. Click OK.
4. From the Major Revision pull-down menu, choose a major revision number for the scanner.
5. Click OK.

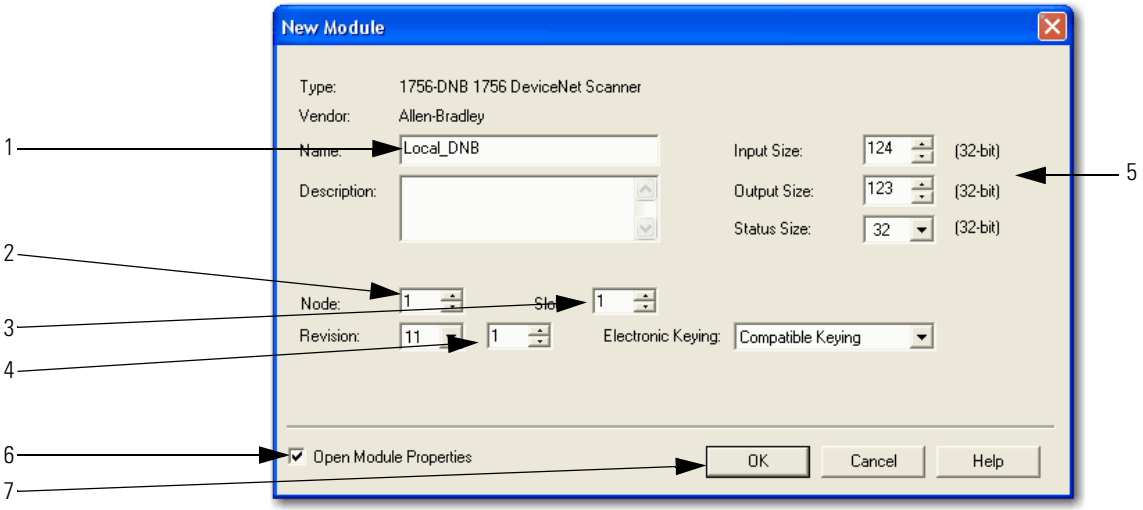


Configure the Scanner

Complete the following steps to configure the scanner.

1. Type a name for the scanner.
2. Enter a node number.
3. Enter the slot number.
4. Enter the minor revision.
5. Enter the size of the input and output memory maps that the scanner will allocate for each device it detects on the network.

   Valid values range from 0...32 bytes per node.
6. If you need to make additional configuration changes, such as setting the requested packet interval (RPI), check Open Module Properties.
7. Click OK.

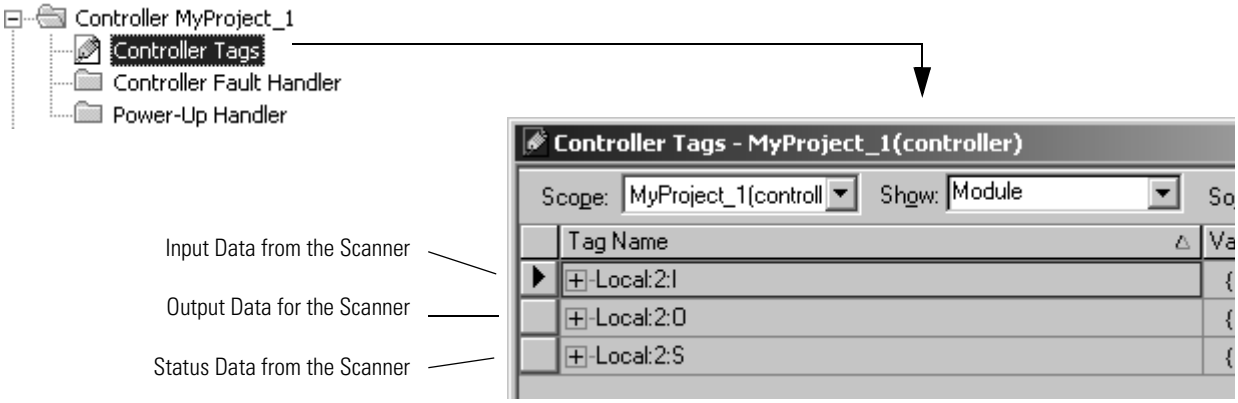


8. If the Module Properties dialog box appears, make additional configuration changes.

   You can change scanner configuration on the following tabs:
   - General
   - Connection
   - RSNetWorx

Determine the Address of DeviceNet Data

When you add the scanner to the I/O configuration of the controller, RSLogix 5000 programming software automatically creates a set of tags for the input, output, and status data of the network.



The tags for your DeviceNet data follow this format.

The scanner memory uses this format...

slot	type	.Data	[element]	.bit

which is this tag in the controller.

location	:type	.Data	[element]	.bit

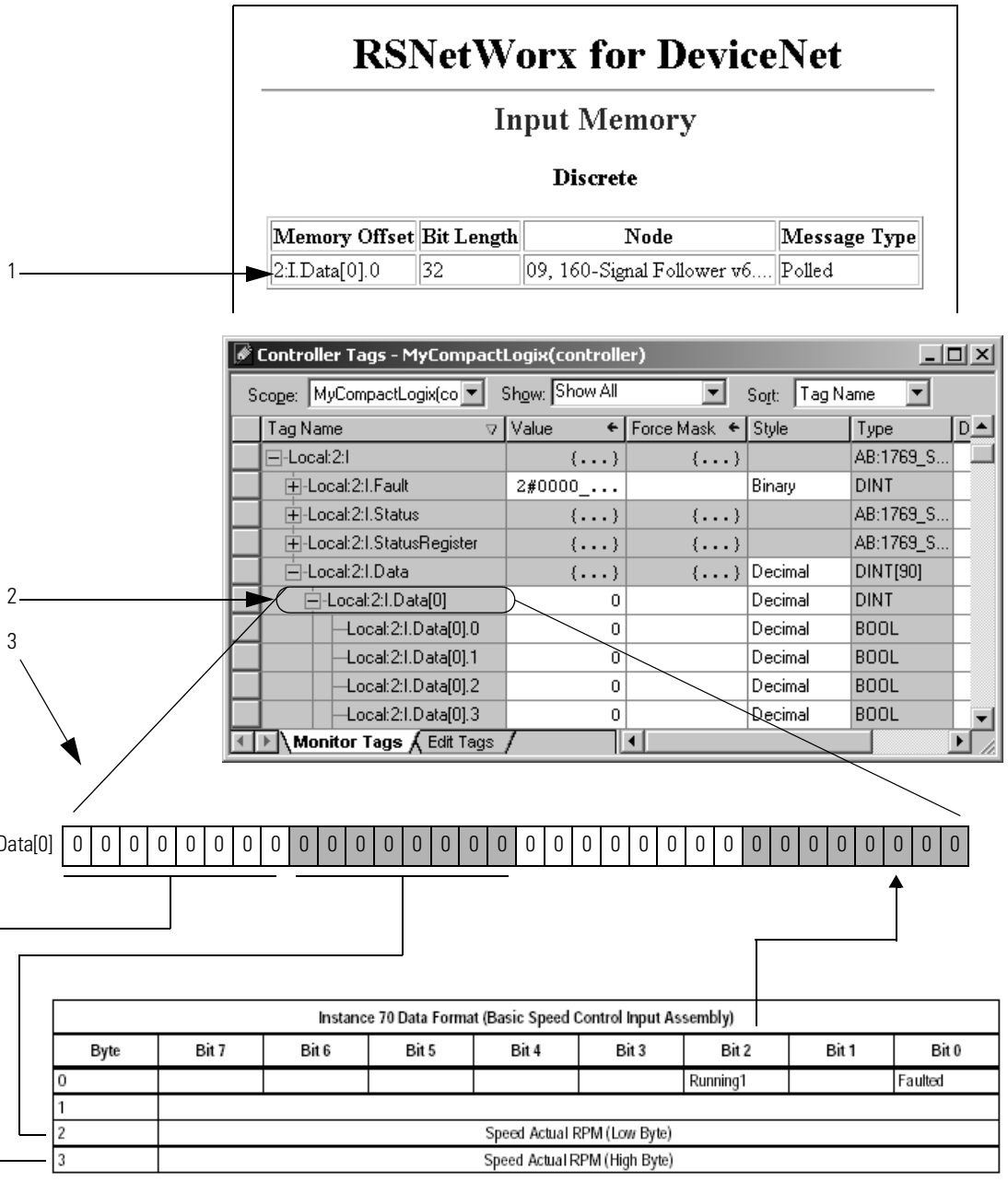
= Optional

Where	**Is**		
Slot	The slot number of the scanner		
Location	**If you have this scanner**	**Then location is**	
	Local ControlLogix 1756-DNB	Local:slot_number_of_scanner	
	Remote ControlLogix 1756-DNB	name_of_remote_bridge:slot_number_of_scanner	
	CompactLogix 1769-SDN	Local:slot_number_of_scanner	
	SoftLogix 5800 1784-PCIDS	Local:slot_number_of_scanner	
	Linking Device 1788-EN2DN or 1788-CN2DN	The name of the linking device in the I/O configuration of the controller	
Type	**If the data is**	**Then type is**	
	Input from a device	I	
	Output to a device	O	
	The status of the network	S	
Element	A specific DINT (DWord, 32-bit integer) within the array		
Bit	A specific bit within an integer		

Complete the following steps to determine the tag name, or address, for DeviceNet data.

1. On the RSNetWorx report for the network, find the memory address for the input or output data of the device.
2. Find the corresponding tag in the controller-scoped tags of the controller.
3. Find the required data within the controller tag.

   Use the data map for the device as a reference.



SoftLogix 5800 Controller

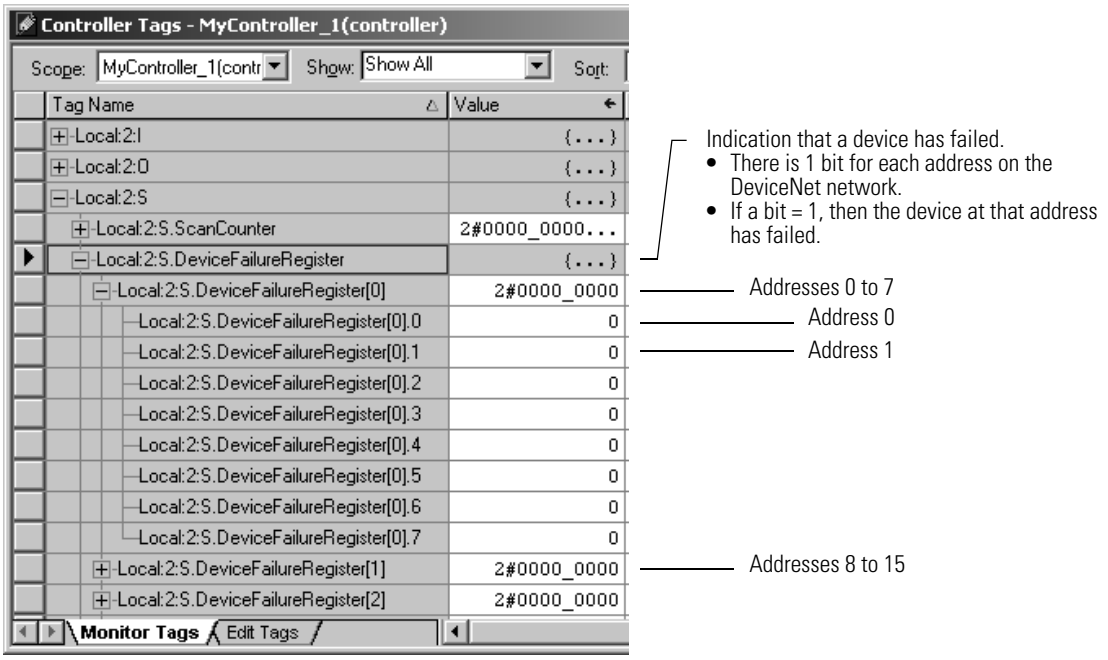
The SoftLogix 5800 scanner 1784-PCIDS organizes input and output memory in 16-bit words. It uses address format word.bit.

Where	Is
Word	INT (16-bit integer) with the memory of the scanner
Bit	A specific bit within an integer

While you can use the input and output tags of the scanner directly in your logic, it is easier to use alias tags.

Determine If a Device Has Failed

If a DeviceNet communication device stops communicating, such as because of a device failure, the tag for the device stays at its last value. To make sure that your input data is valid, we recommend that you buffer the input data and examine the device failure register.



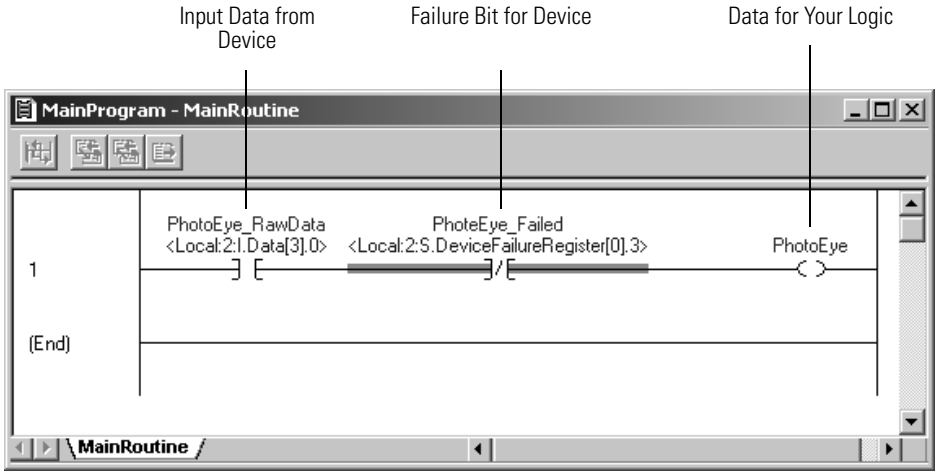
On every scan of the controller, execute logic similar to the following:

If PhotoEye_RawData = 1 and PhotoEye_Failed = 0 then

PhoteEye = 1

Otherwise PhoteEye = 0

Use the PhotoEye tag in the rest of your logic (not PhotoEye_RawData).



Place the Scanner in Run Mode

Complete the following steps to run the DeviceNet network.

1. Set the following bit of the output structure for the scanner.

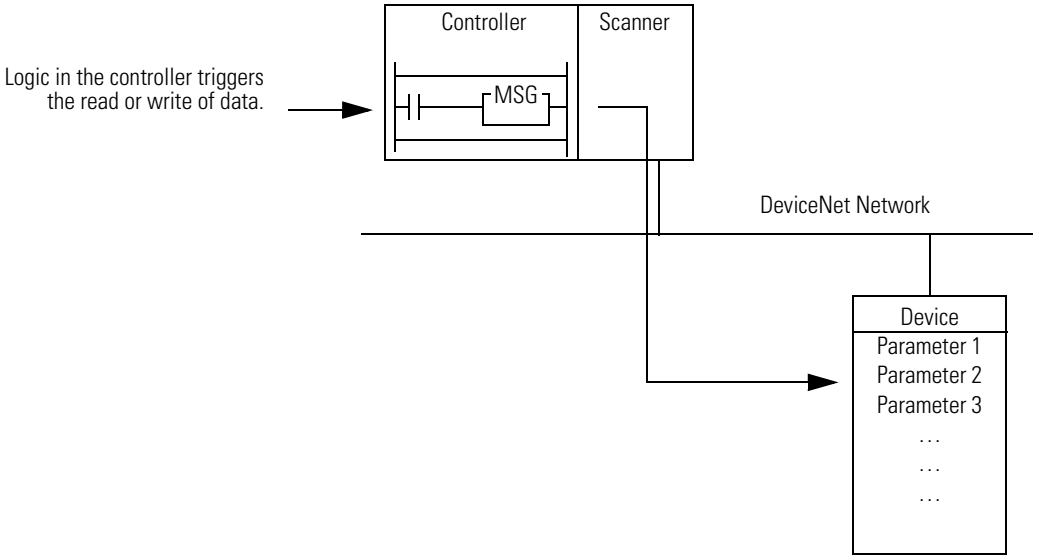
To put the scanner in Run mode, turn on this bit. →

If you want to	Set this bit	To
Run the network	…O.CommandRegister.Run	1
Not run the network (idle mode)	…O.CommandRegister.Run	0
Fault the network	…O.CommandRegister.Fault	1
Not fault the network	…O.CommandRegister.Fault	0
Disable the network	…O.CommandRegister.DisableNetwork	1
Enable the network	…O.CommandRegister.DisableNetwork	0
Halt the scanner (ceases all operation)	…O.CommandRegister.HaltScanner	1
Unhalt the scanner	…O.CommandRegister.HaltScanner	0
Reset the scanner	…O.CommandRegister.Reset	1
Resume operation after a reset	…O.CommandRegister.Reset	0

2. Place the controller in Run or Remote Run mode.

When to Use a MSG Instruction

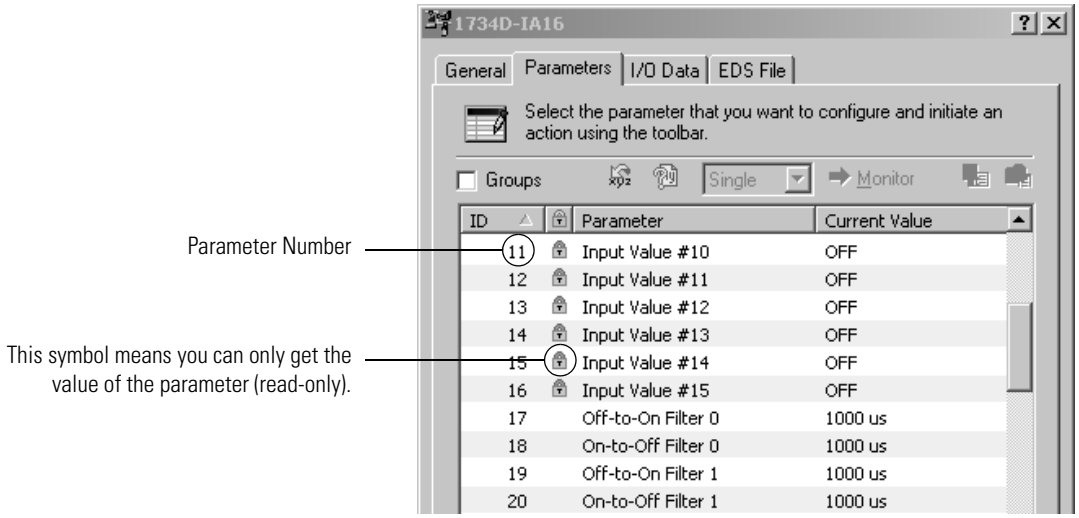
If you want to set or get a parameter based on conditions in your logic, use a Message (MSG) instruction in ladder logic to access the parameter.



Some parameters **do not** require ongoing updates. For example, initializing configuration parameters may occur only when the controller goes to Run mode. By using a MSG instruction for those parameters, you save bandwidth on the DeviceNet network for more critical or ongoing data.

Determine the Parameter Number to Access

In RSNetWorx for DeviceNet software, determine the parameter number that you want to access. Some parameters are locked, as shown in the following graphic.



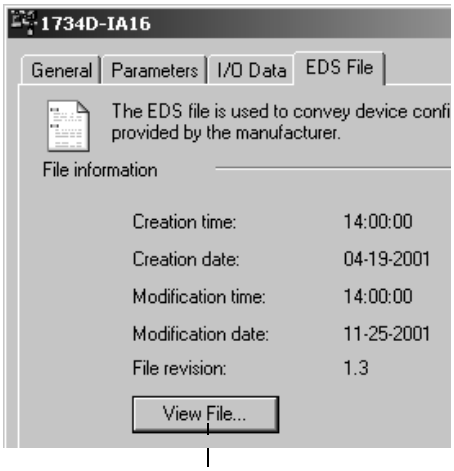
Determine the Configuration of the Parameter

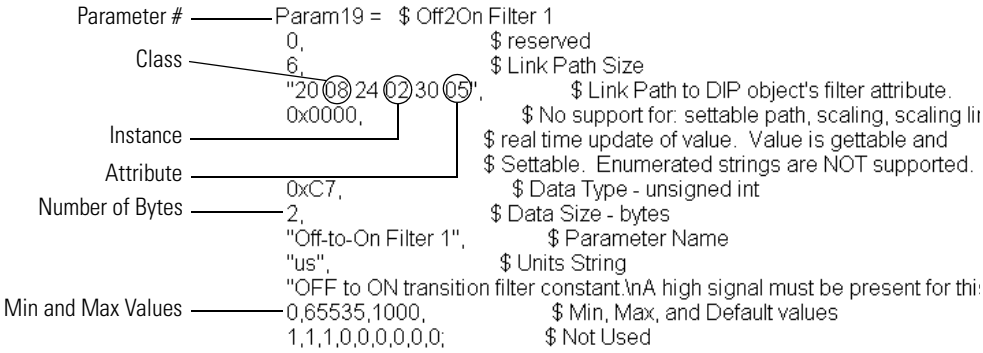
To get or set a parameter, you must find the following information about it:

- Class # (hex)
- Instance # (hex)
- Attribute # (hex
- Number of bytes (size)
- Minimum value
- Maximum value
- Decimal places

Some devices assume a specific number of decimal places in a value.

In addition to the documentation for the device, the EDS file may also give you the required information.


1734D-IA16
General
Parameters
I/O Data
EDS File
The EDS file is used to convey device confi
provided by the manufacturer.
File information
Creation time: 14:00:00
Creation date: 04-19-2001
Modification time: 14:00:00
Modification date: 11-25-2001
File revision: 1.3
View File...

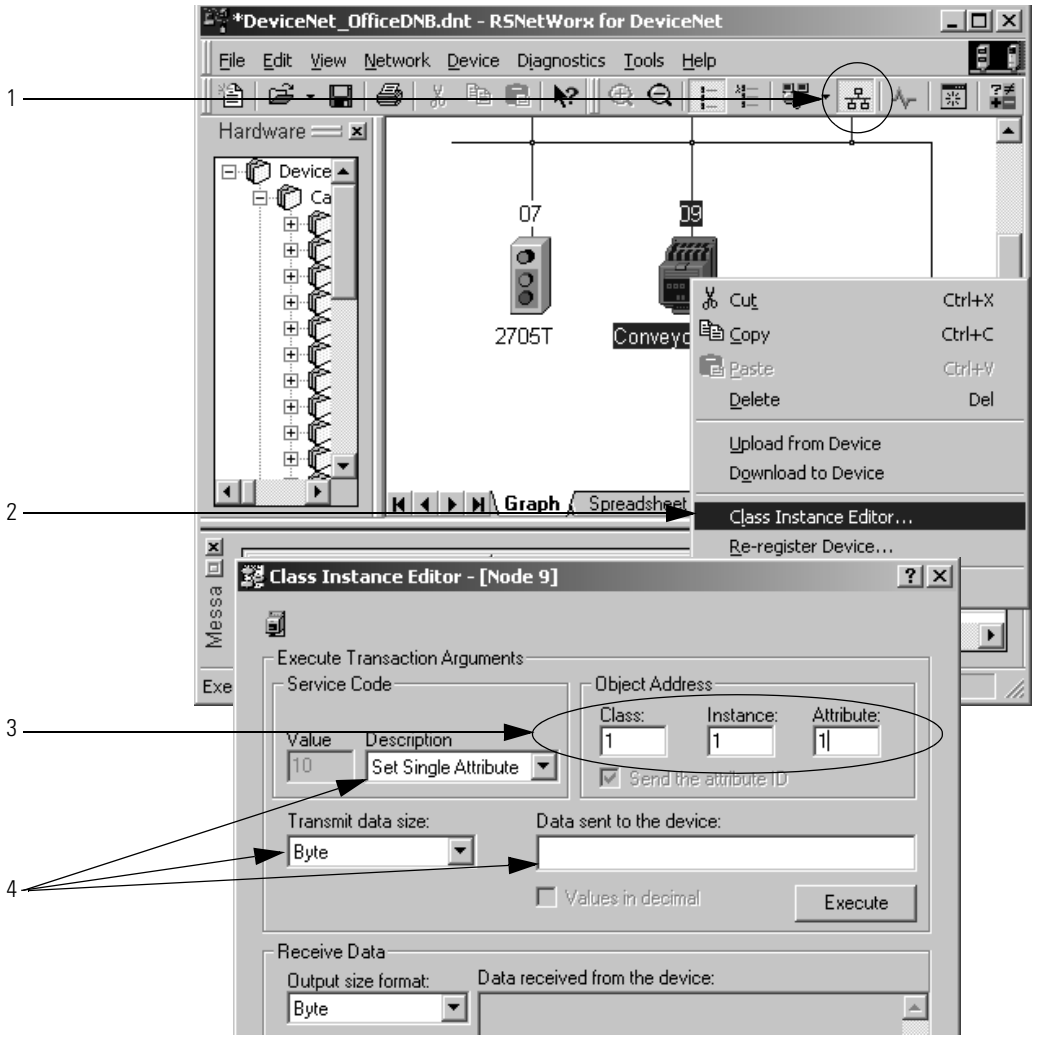

Parameter #
Class
Instance
Attribute
Number of Bytes
Min and Max Values
Param19 = $ Off2On Filter 1
0, $ reserved
6, $ Link Path Size
"20 08 24 02 30 05", $ Link Path to DIP object's filter attribute.
0x0000, $ No support for: settable path, scaling, scaling li
$ real time update of value. Value is gettable and
$ Settable. Enumerated strings are NOT supported.
0xC7, $ Data Type - unsigned int
2, $ Data Size - bytes
"Off-to-On Filter 1", $ Parameter Name
"us", $ Units String
"OFF to ON transition filter constant.\nA high signal must be present for thi
0,65535,1000, $ Min, Max, and Default values
1,1,1,0,0,0,0,0,0; $ Not Used

Test the Parameter

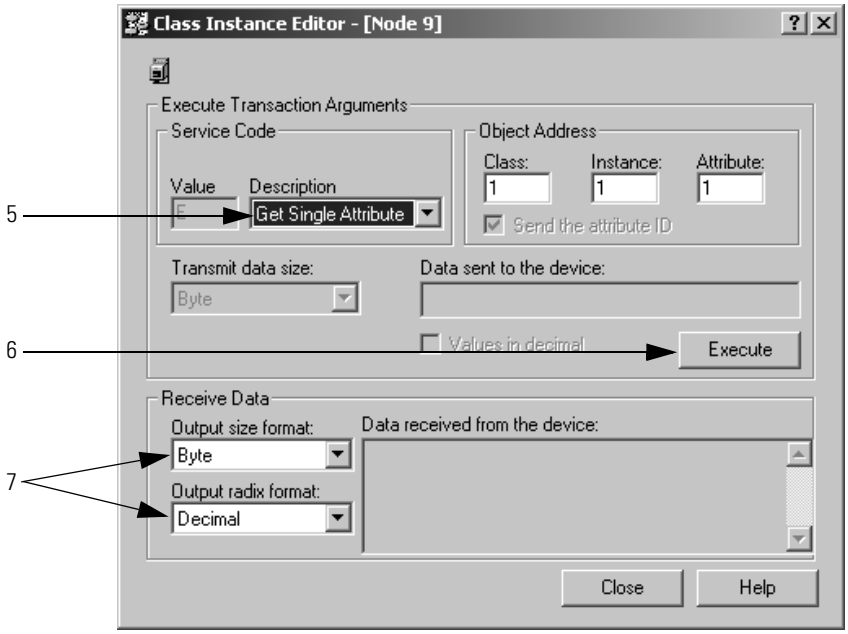
A simple way to make sure that you have the correct configuration for a parameter, such as data size or values, is to use the Class Instance editor in RSNetWorx for DeviceNet software.

Complete the following steps to test the parameter.

1. In RSNetWorx for DeviceNet software, go online to the DeviceNet network.
2. Right-click the device and choose Class Instance Editor.
3. Type the class, instance, and attribute for the parameter.
4. Change the parameter.
   a. Choose Set Single Attribute.
   b. Choose the number of bytes.
   c. Type the new value in hexadecimal format.



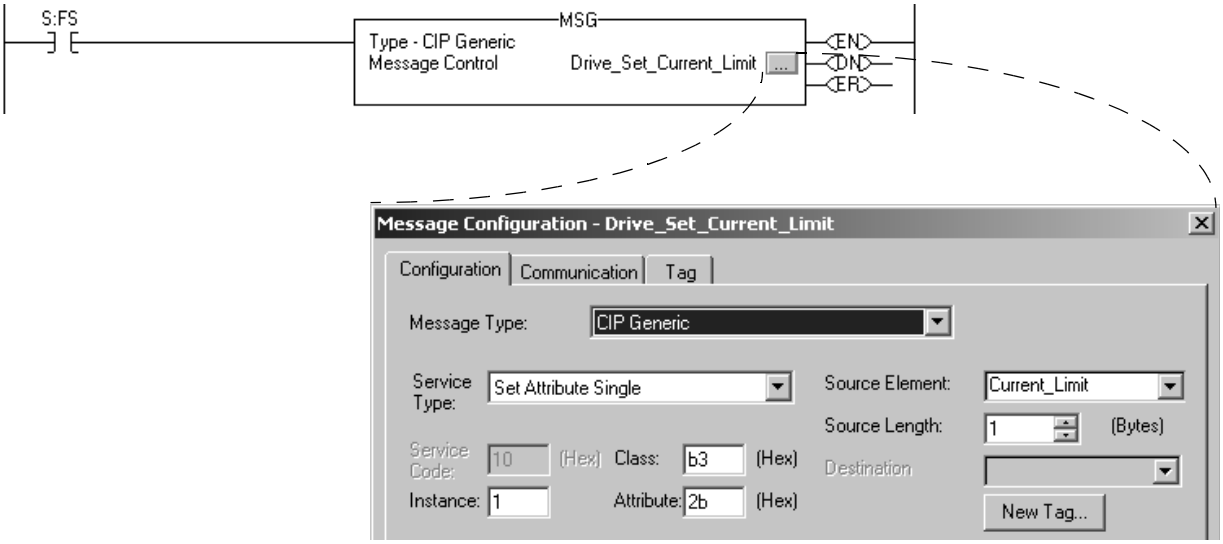
5. From the Description pull-down menu, choose Get Single Attribute to read the parameter.
6. Click Execute.
7. To change how output data is displayed, choose the size and format.



Enter Message Logic

To access the parameter of a device (get or set the parameter), configure the MSG instruction as CIP Generic.

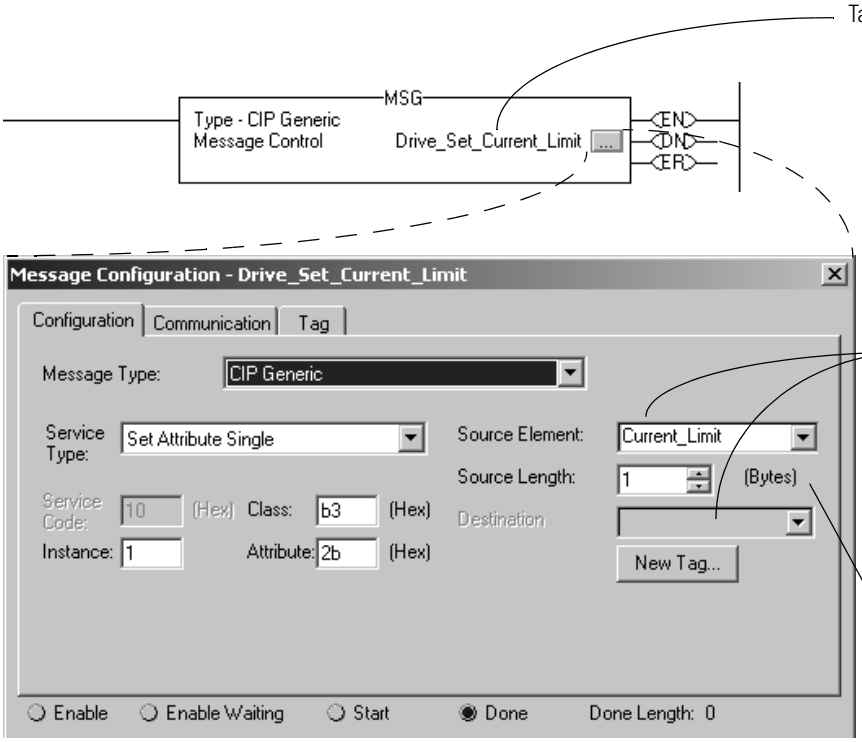
Change the current limit of the drive.



You must complete the following tasks to configure the MSG instruction:

- Define the Source or Destination Data
- Enter and Configure the MSG Instruction
- Set the Communication Path

Define the Source or Destination Data



Tag that controls the instruction.

- Scope—Controller.
- Data type—MESSAGE.
- The tag **cannot** be part of an array or a user-defined data type.

Source or destination for the data that the instruction sets or gets.

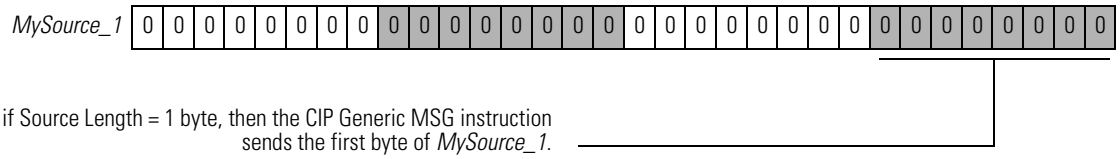
- Scope—Controller.
- Data type—In general, use the DINT data type, even when you set or get less than 4 bytes.
- Value—Make sure the source value stays within the minimum and maximum values for the parameter that you are setting.

Number of bytes (only if setting a value).

In general, follow these guidelines:

- Use the DINT data type for the source or destination tag, even when you set or get less than 4 bytes.
- Make sure the source value stays within the minimum and maximum values for the parameter that you are setting.

When setting a value, the CIP Generic MSG instruction takes only the specified number of bits from the source tag.



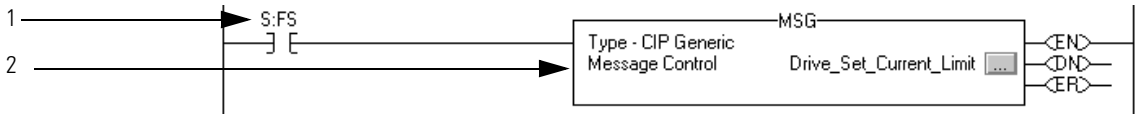
To increase the efficiency of your logic, minimize the use of SINT or INT data types. Whenever possible, use the DINT data type for integers.

- A Logix5000 controller typically compares or manipulates values as 32-bit values (DINTs or REALs).
- The controller typically converts a SINT or INT value to a DINT or REAL value before it uses the value.
- If the destination is a SINT or INT tag, the controller typically converts the value back to a SINT or INT value.
- The conversion to or from SINTs or INTs occurs automatically with no extra programming. However, it takes extra execution time and memory.

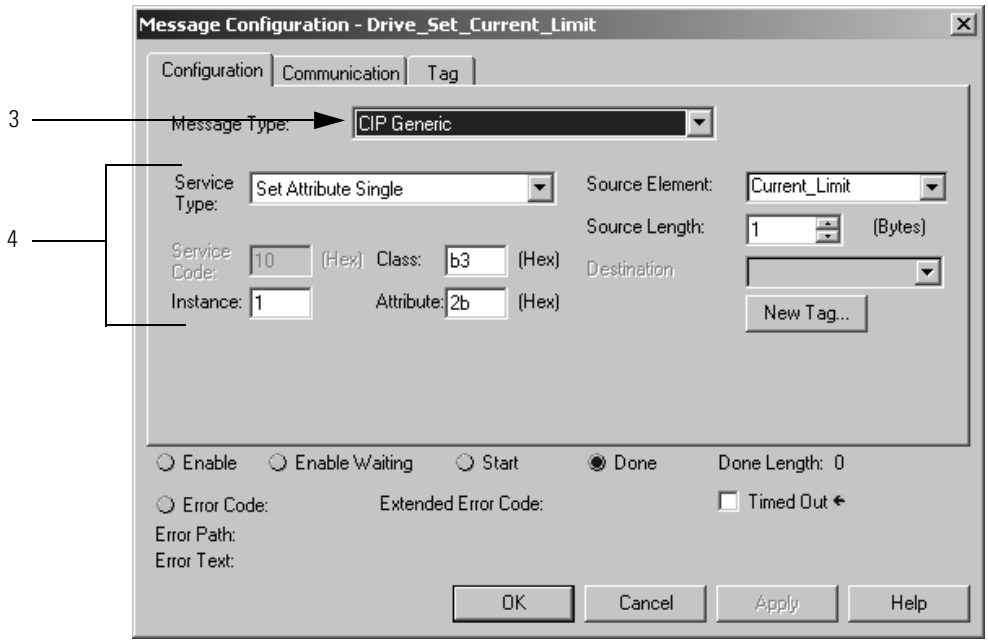
Enter and Configure the MSG Instruction

Complete the following steps to enter and configure the Message (MSG) instruction.

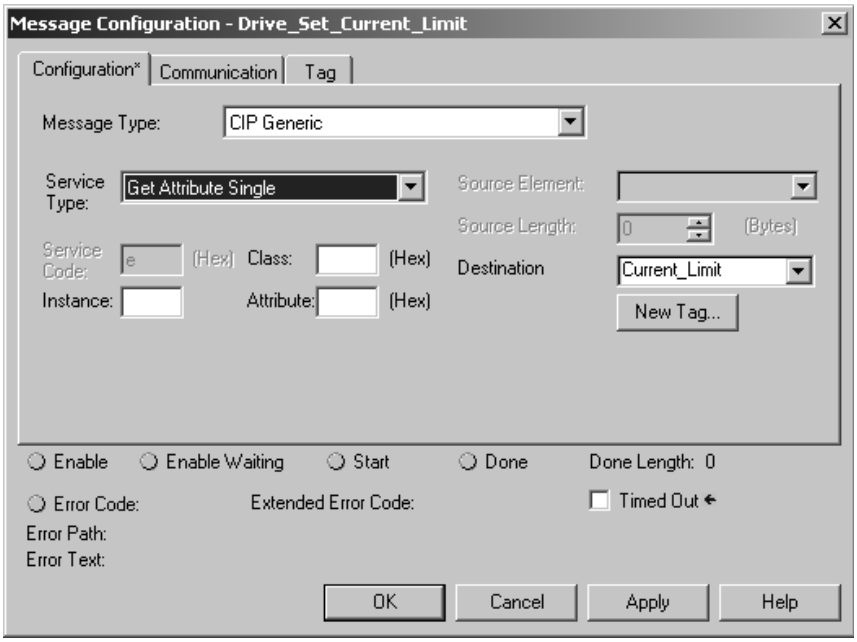
1. Enter the condition for the data transfer.
2. Enter the MSG instruction.



3. Choose CIP Generic.
4. To change a parameter:
   - Choose Set Attribute Single.
   - Choose the tag that has the new value.
   - Enter the number of bytes.
   - Type the class, instance, and attribute for the parameter in hexadecimal format.



5. To read a parameter:
   - Choose Get Attribute Single from the Service Type pull-down menu.
   - Choose the tag to store the value from the Destination pull-down menu.
   - Type the class, instance, and attribute for the parameter in hexadecimal format.



Set the Communication Path

The communication path specifies the route to the device. A communication path follows this format:

scanner_name,2,device_address

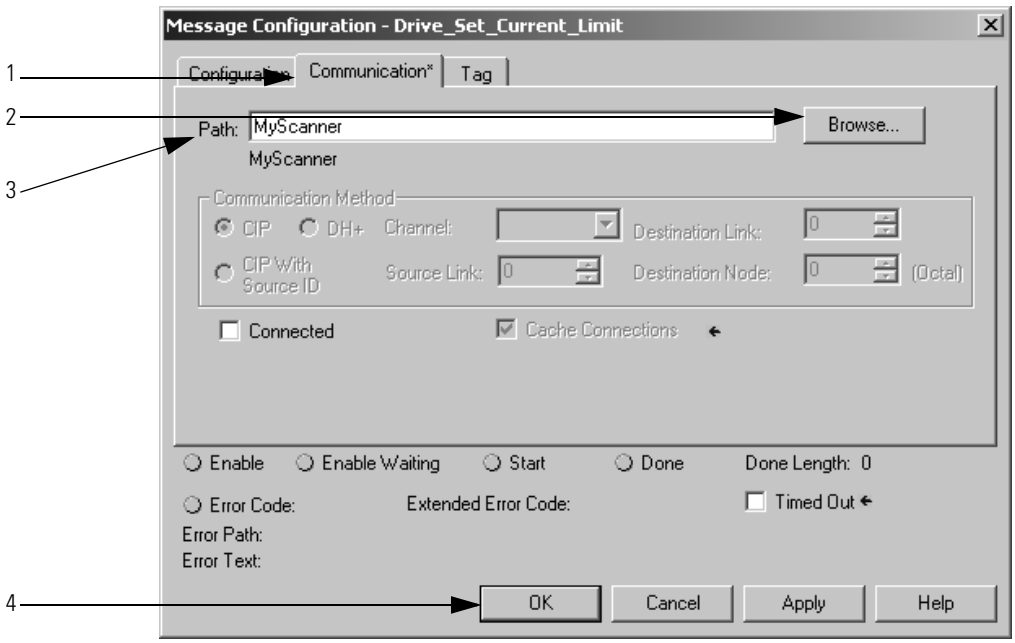
Where	Is
scanner_name	The name of the scanner in the I/O Configuration folder of the controller.
device_address	The address of the device on the DeviceNet network.

EXAMPLE If the name of the scanner is MyScanner and the device is at address 3, the path is as follows:

MyScanner,2,3

Complete the following steps to set the communication path.

1. Click the Communication tab.
2. Click the Browse button and select the scanner.
3. Type the rest of the path.
4. Click OK.



Typically, a CIP Generic MSG instruction requires no connection to transfer its data.

This type of message	Using this communication method	Uses a connection
CIP data table read or write	CIP	Yes
PLC2, PLC3, PLC5, or SLC (all types)	CIP	No
	CIP with Source ID	No
	DH+	Yes
CIP Generic	CIP	Your choice(1)
Block-transfer read or write	N/A	Yes

(1) You can connect CIP generic messages, but for most applications we recommend you leave CIP Generic messages unconnected.

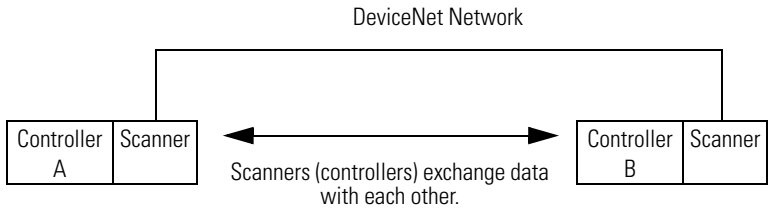
For more information on programming MSG instructions, see the Logix5000 Controller General Instructions Reference Manual, publication 1756-RM003.

Interlock and Share Inputs

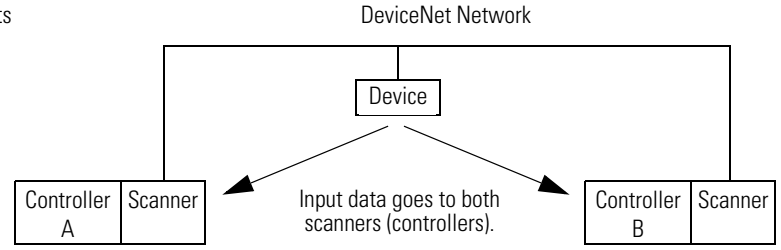
The chapter describes how to interlock and share inputs over a DeviceNet network.

Topic	Page
Interlock	124
Share Inputs	129

Interlocking



Sharing Inputs



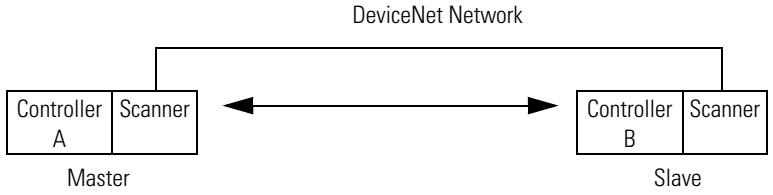
Interlock

To set up an interlock between two controllers over a DeviceNet network, complete the following tasks:

- Choose a Master Controller
- Determine How Much Data to Exchange
- Enable Slave Mode for the Slave Scanner
- Map the Slave Mode Data
- Add the Slave to the Master Scanner's Scan List
- Map the Data of the Slave
- Place Both Scanners In Run Mode

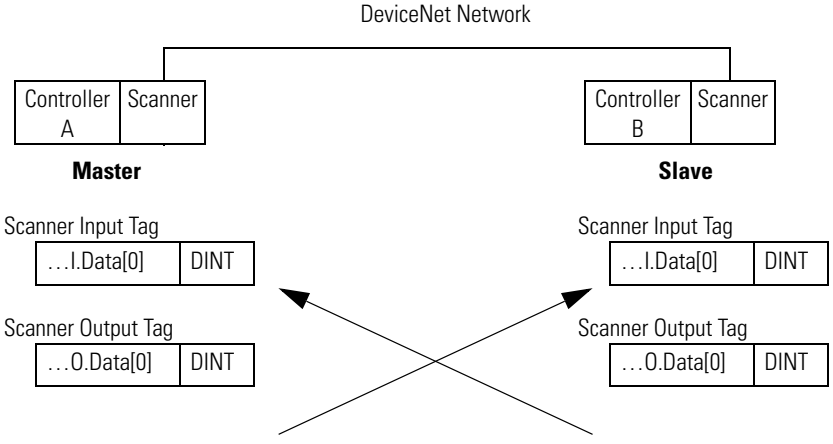
Choose a Master Controller

To interlock, choose a controller to serve as the master. The other controller becomes a slave to the master. This defines the relationship between the controllers. The scanners of each controller still scan and control their own devices, if desired.



Determine How Much Data to Exchange

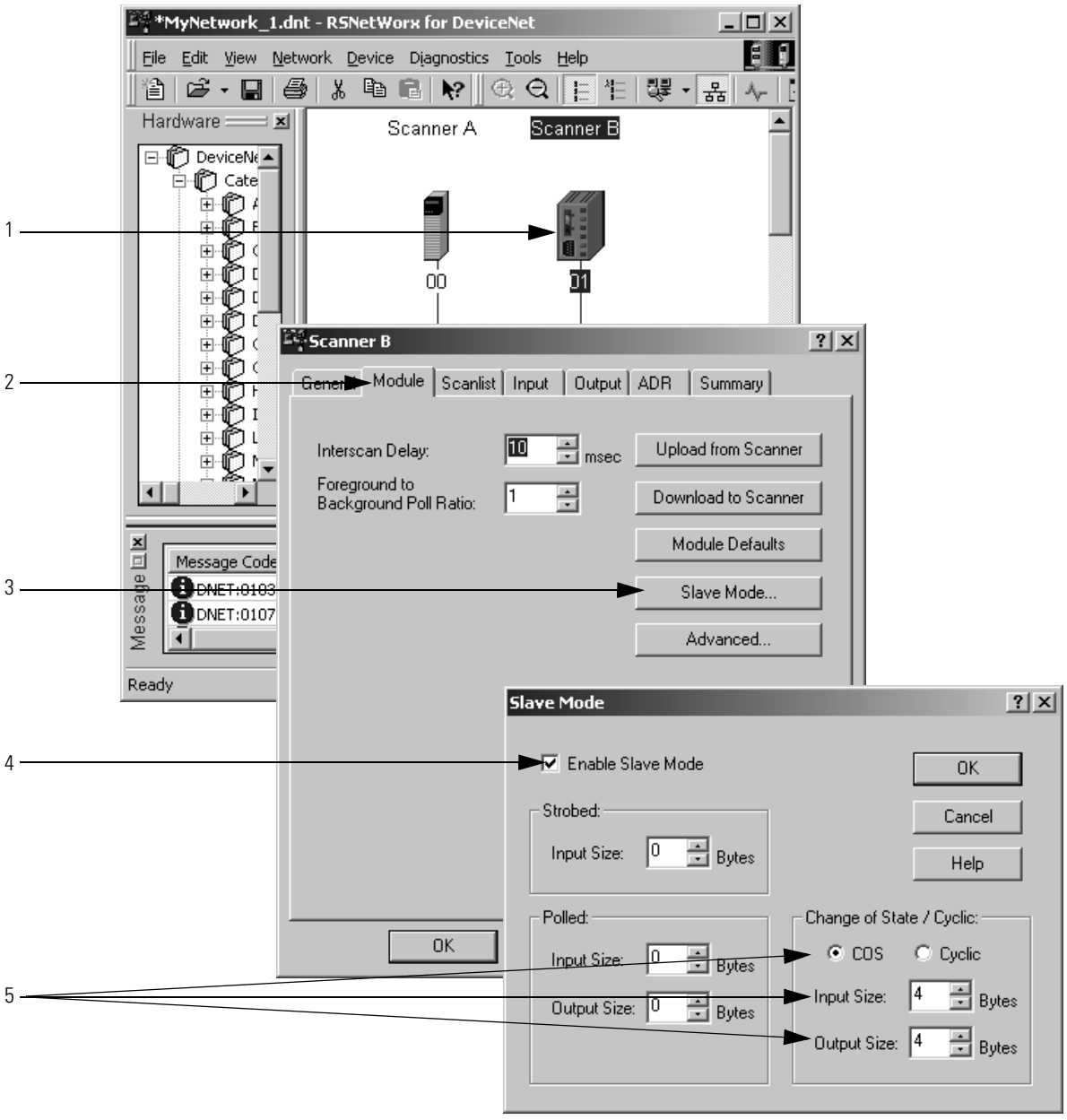
Before you configure the scanners for the interlock, determine how much data you want to exchange between the controllers.



Enable Slave Mode for the Slave Scanner

Complete the following steps to enable Slave mode.

1. In RSNetWorx for DeviceNet software, double-click the slave scanner to open its properties.
2. Click the Module tab.
3. Click Slave Mode.
4. Check the Enable Slave Mode check box.
5. Define the I/O parameters.

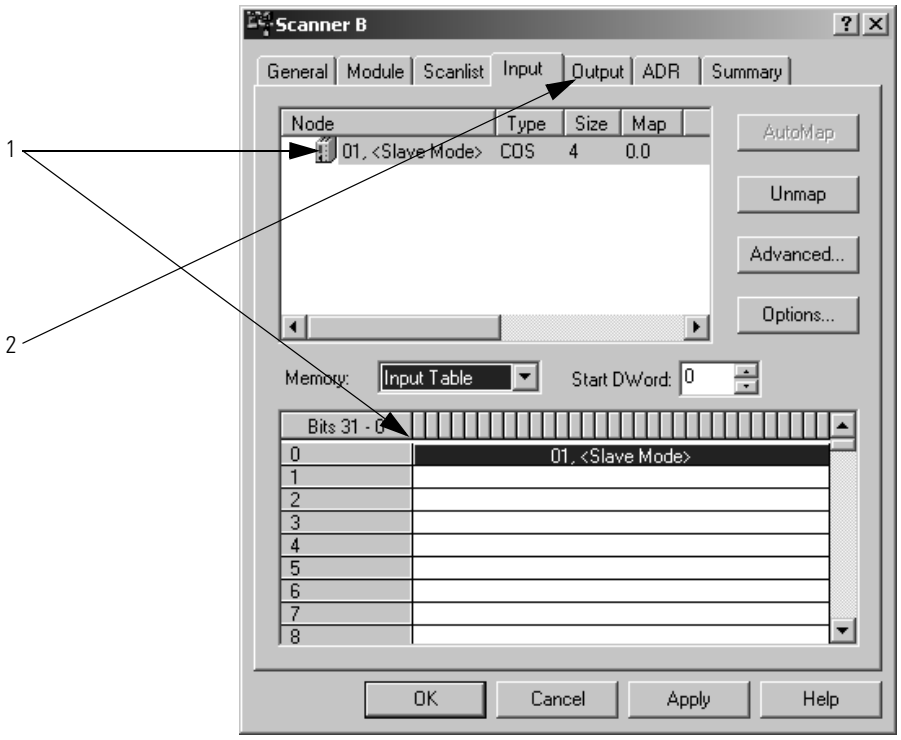


Map the Slave Mode Data

Complete the following steps to map Slave mode data.

1. Map the Slave mode data to the input memory of the slave scanner.

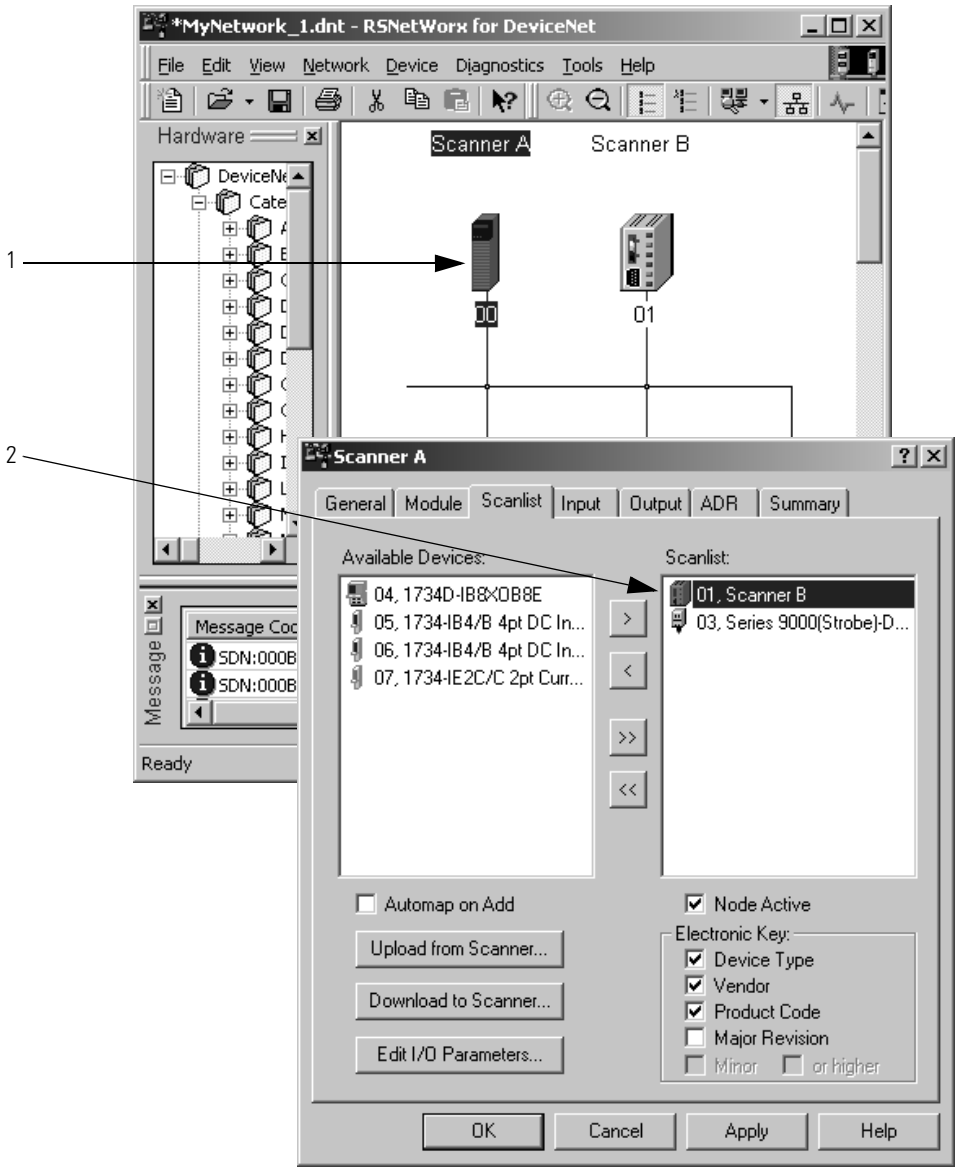
   This is the data that the scanner (controller) gets from the master.
2. Repeat for the data that the slave scanner (controller) sends to the master.



Add the Slave to the Master Scanner's Scan List

Complete the following steps to add the slave to the master's scan list.

1. In RSNetWorx for DeviceNet software, double-click the master scanner to open its properties.
2. Add the slave to the scan list.

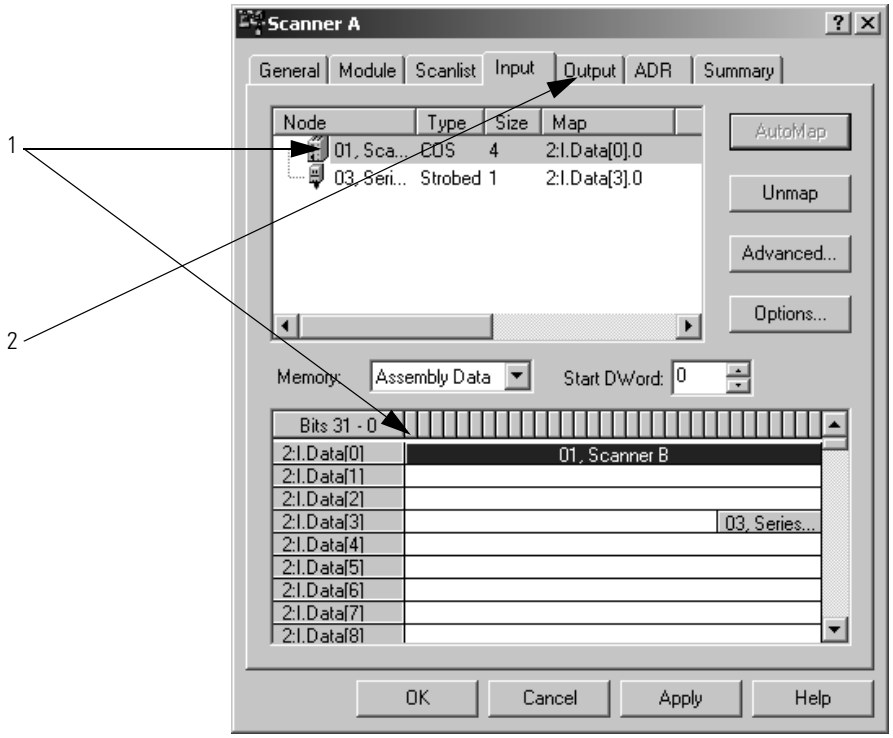


Map the Data of the Slave

Complete the following steps to map the data.

1. Map the slave scanner to the input memory of the master scanner.

   This is the data that the scanner (controller) gets from the slave.
2. Repeat for the data that the master scanner (controller) sends to the slave.



Place Both Scanners In Run Mode

To exchange data, place both scanners in Run mode. Refer to Place the Scanner in Run Mode on page 113 for more information on placing both scanners in Run mode.

Share Inputs

To let multiple scanners (controllers) consume input data from the same input device, complete the tasks in this section.

Add the Input to the First Scanner

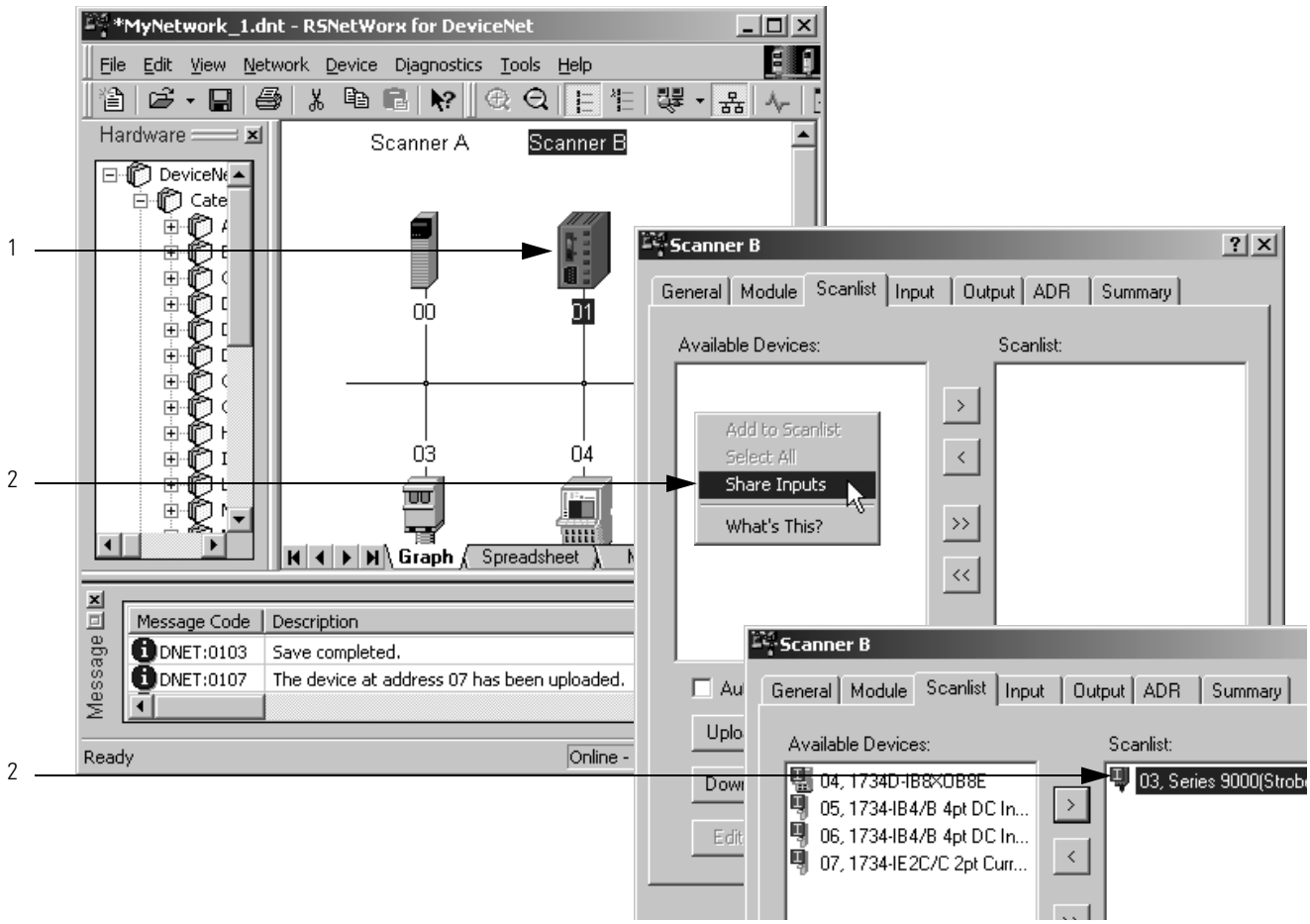
Establish communication between the input and one of the scanners. Use one of the following sections to establish communication:

- Configure the Network Offline on page 37
- Configure the Network Online on page 57

Add the Input to the Second Scanner

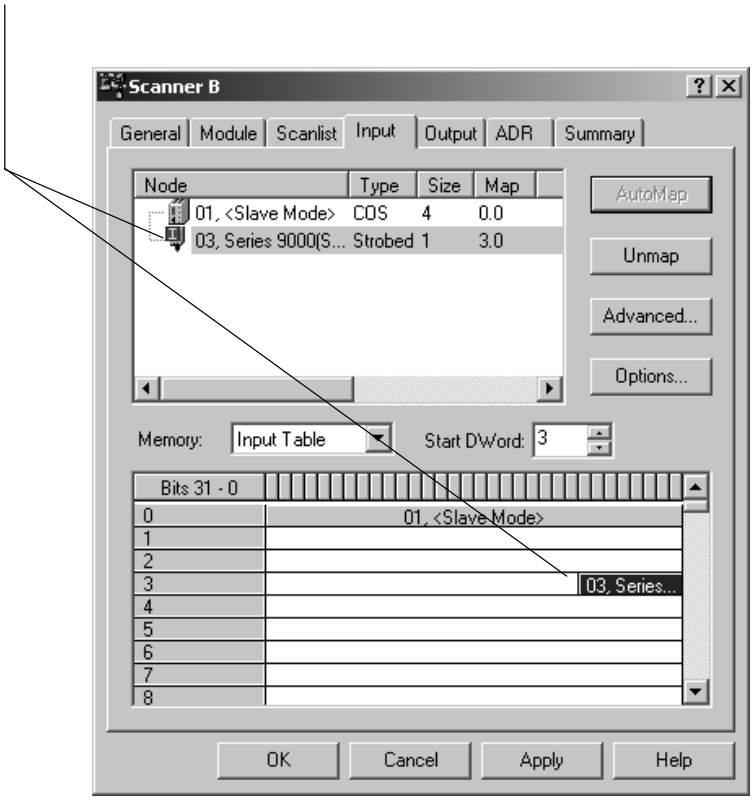
Complete the following steps to add the input to the second scanner.

1. In RSNetWorx for DeviceNet software, display the scan list for the second scanner.
2. In the Available Devices list, right-click and choose Shared Inputs.
3. Add the input to the scan list.



Map the Input Data in the Second Scanner

Map the input data to the input memory of the second scanner.



Communicate with a PanelView Standard Terminal

This chapter describes how to configure and program communication with a PanelView Standard terminal on a DeviceNet network.

Topic	Page
Choose Data Types	131
Choose a Communication Method	132
Plan and Configure I/O Slave Tags	134
Set Up the Terminal on Your Network	136
Configure the Scanner to Update I/O Slave Tags	138
Address I/O Slave Tags in the RSLogix 5000 Programming Software Project	141
Plan and Configure Explicit Server Tags	143
Program the Controller to Get/Set Explicit Server Tags	146
Configure Explicit Client Tags	150

Choose Data Types

For the tags in the PanelView terminal, use the data types described in the following table as a starting point.

If the object on the PanelView screen reads or writes	Then use this data type	Which uses this many bits in the PanelView terminal
Single bit	Bit	1
Integer	Unsigned integer	16

Data types, such as signed integer and float, also work with Logix5000 controllers. However, they require additional configuration and programming.

Choose a Communication Method

You have three options to send data to and from a PanelView terminal.

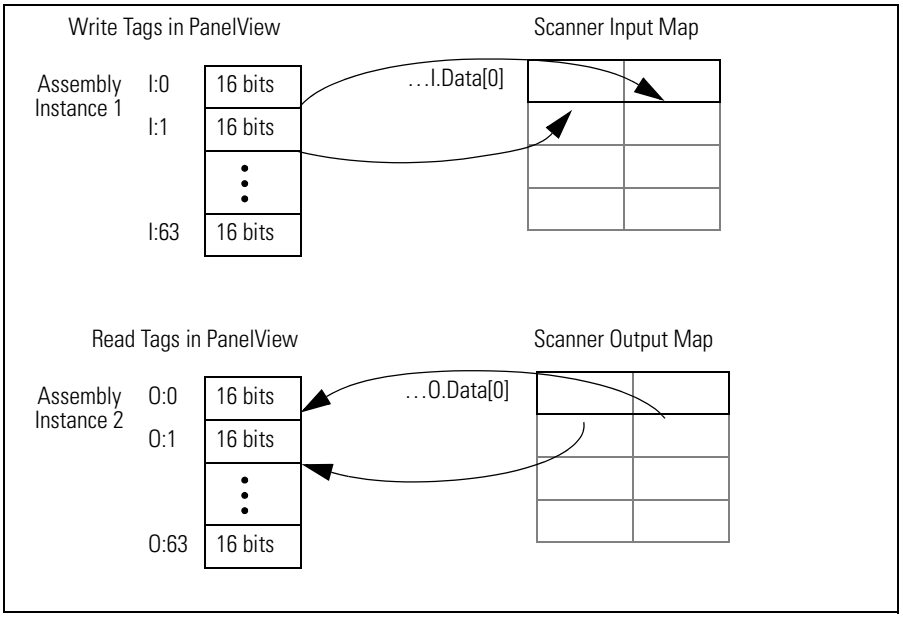
If you want to	Use this method	Considerations
Communicate with the PanelView terminal using the regular I/O communication of the DeviceNet network	I/O slave	• Easiest to use—requires no additional programming. • Use this as your first choice. • Higher priority on the network than explicit server and explicit client updates.
Communicate with the PanelView terminal based on conditions in your logic	Explicit server	• Provides additional data when you use up the I/O slave assemblies. • Lower priority on the network than I/O slave updates.
Use the PanelView terminal to get or set a parameter of a device on your DeviceNet network (not a controller)	Explicit client	• **Does not** use the controller or scanner. • Lower priority on the network than I/O slave updates.

I/O Slave Communication

I/O Slave

Scanner polls PanelView Terminal for I/O data.

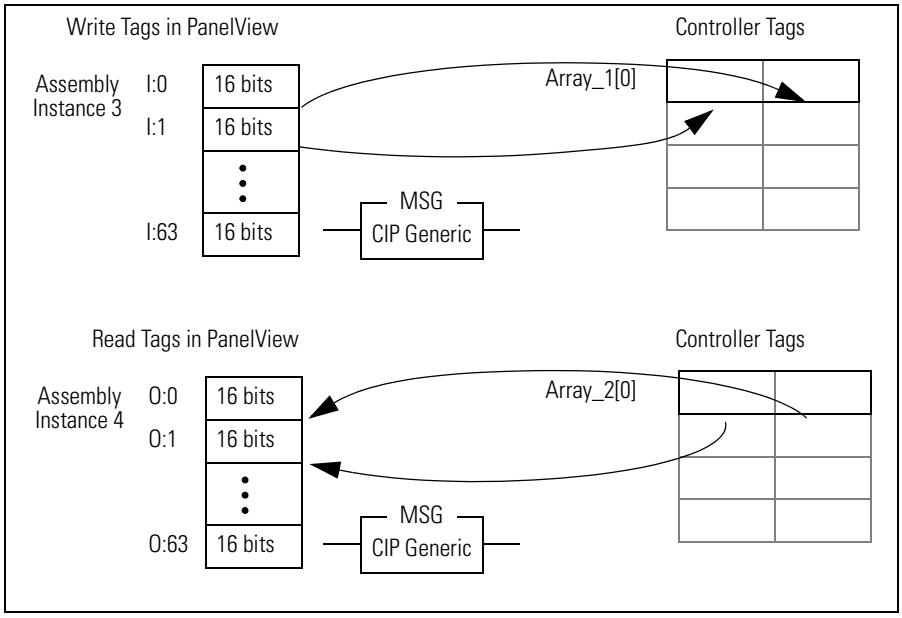
- You define the input and output sizes up to 64 words.
- Assembly instance 1 gives input data to the controller.
- Assembly instance 2 gets output data from the controller.



Explicit Server Communication

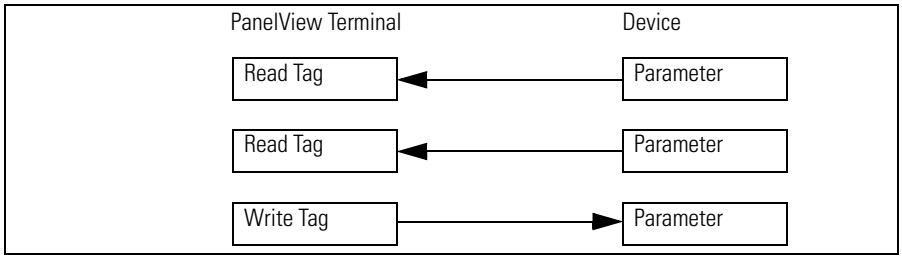
Explicit Server
Controller executes a MSG instruction that gets or sets data in the PanelView terminal.

- 14 assembly instances are available for explicit - server transfers.
- Instance #s are 3…16.
- You define an instance as either input data (I) or output data (O), but not both.
- Each instance provides 64 words of either input or output data for the terminal.



Explicit Client Communication

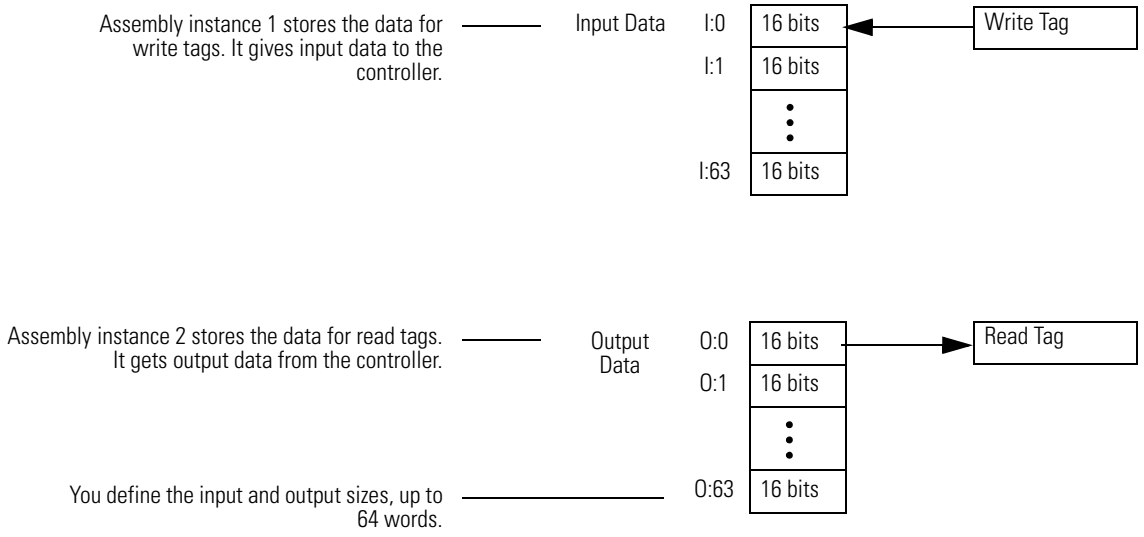
Explicit Client
PanelView terminal sets or gets data in another device on a tag-by-tag basis.



Plan and Configure I/O Slave Tags

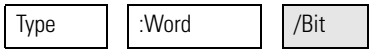
Like the other DeviceNet communication modules, I/O slave tags use space in the input and output maps of the scanner. The scanner gets or sets the data on each scan of the DeviceNet network.

A PanelView terminal gives you two blocks of 16-bit words (assembly instances) for I/O slave tags.



Use a Word/Bit Format for Each Tag

Each I/O slave tag requires a specific address in the corresponding assembly instance. A tag address uses the following format:



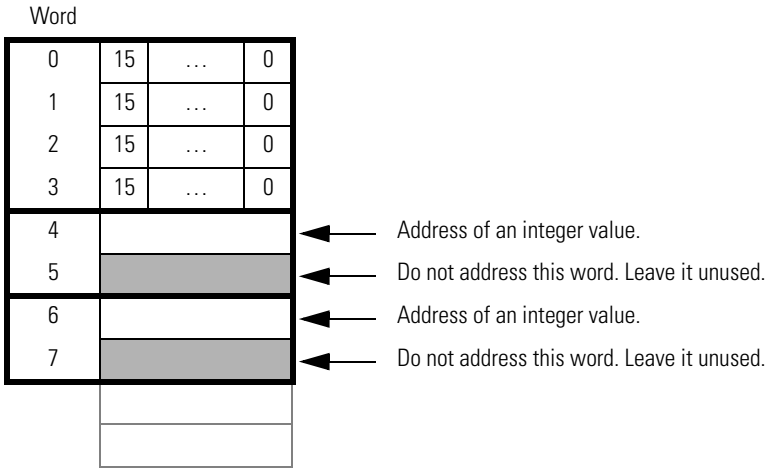
= Optional

Where	Is	
Type	Type of tag	
	If the tag is a	**Then use**
	Write tag (sends input data to the controller)	I
	Read tag (gets output data from the controller)	O
Word	Specific 16-bit word within the assembly	
Bit	Specific bit within Word (0…15)	

For Integers, Skip Every Other Word

Logix5000 controllers use 32-bit integers (DINTs). To make your programming easier, lay out your PanelView tags as follows.

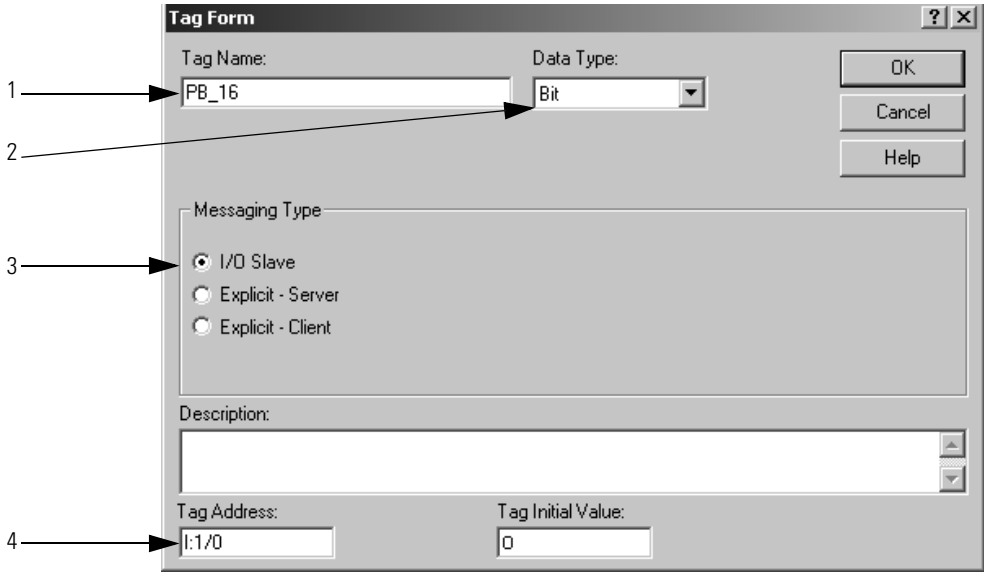
1. For bit-level tags, set aside an even number of words.
2. For each integer, set aside two words. Start each integer on an even word. This lets each integer map to its own element in the scanner/controller.



Configure an I/O Slave Tag

Complete the following steps to configure an I/O slave tag.

1. Type a descriptive name for the tag.
2. Choose the data type for the tag.
3. Let the scanner update the data.
4. Assign an address for the tag within the input or output assembly.



Set Up the Terminal on Your Network

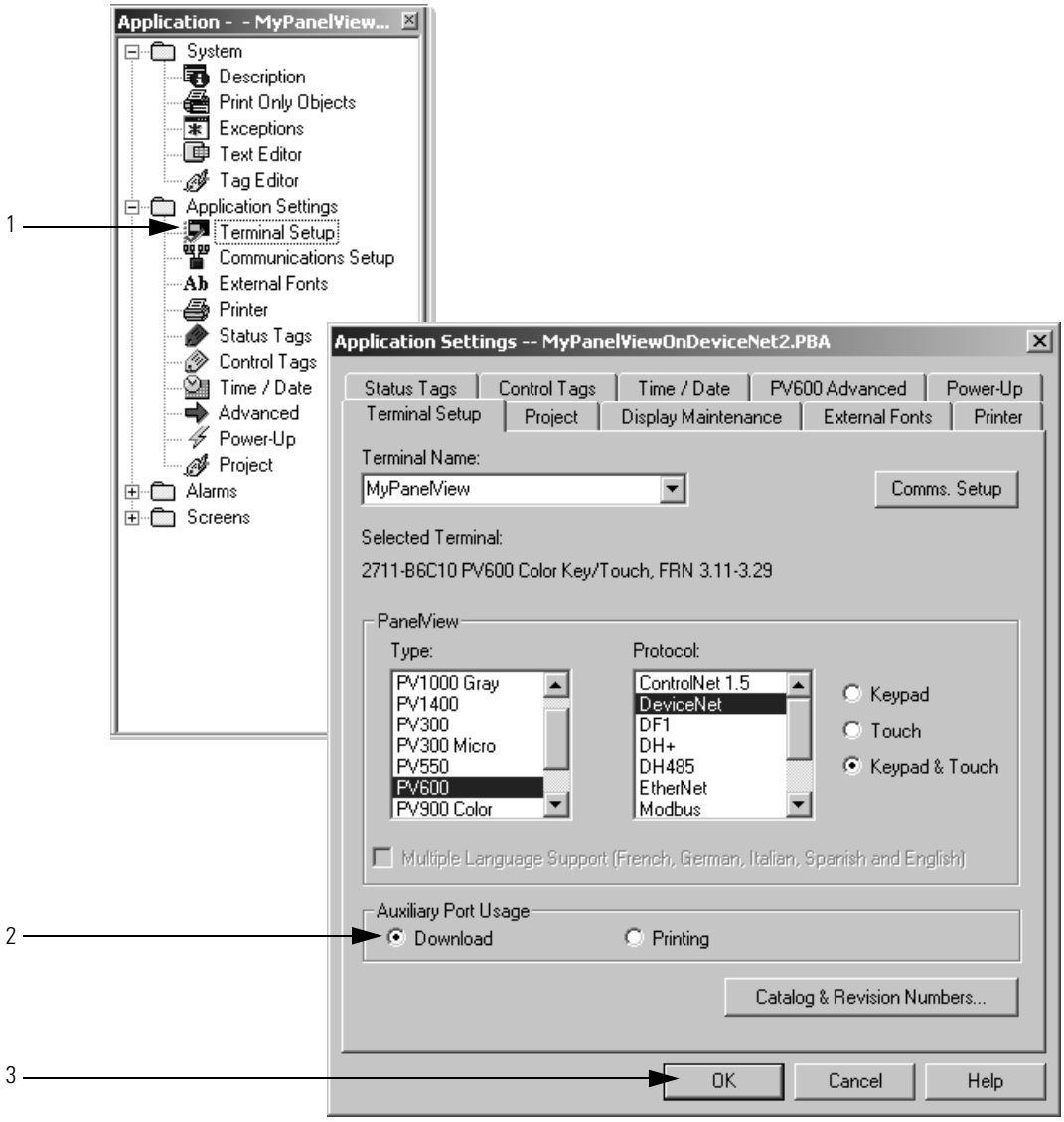
You must complete the following tasks in PanelBuilder32 software to configure a PanelView terminal for communication on a DeviceNet network:

- Set the Protocol
- Set the Node Address and I/O Sizes

Set the Protocol

Complete the following steps to set the protocol.

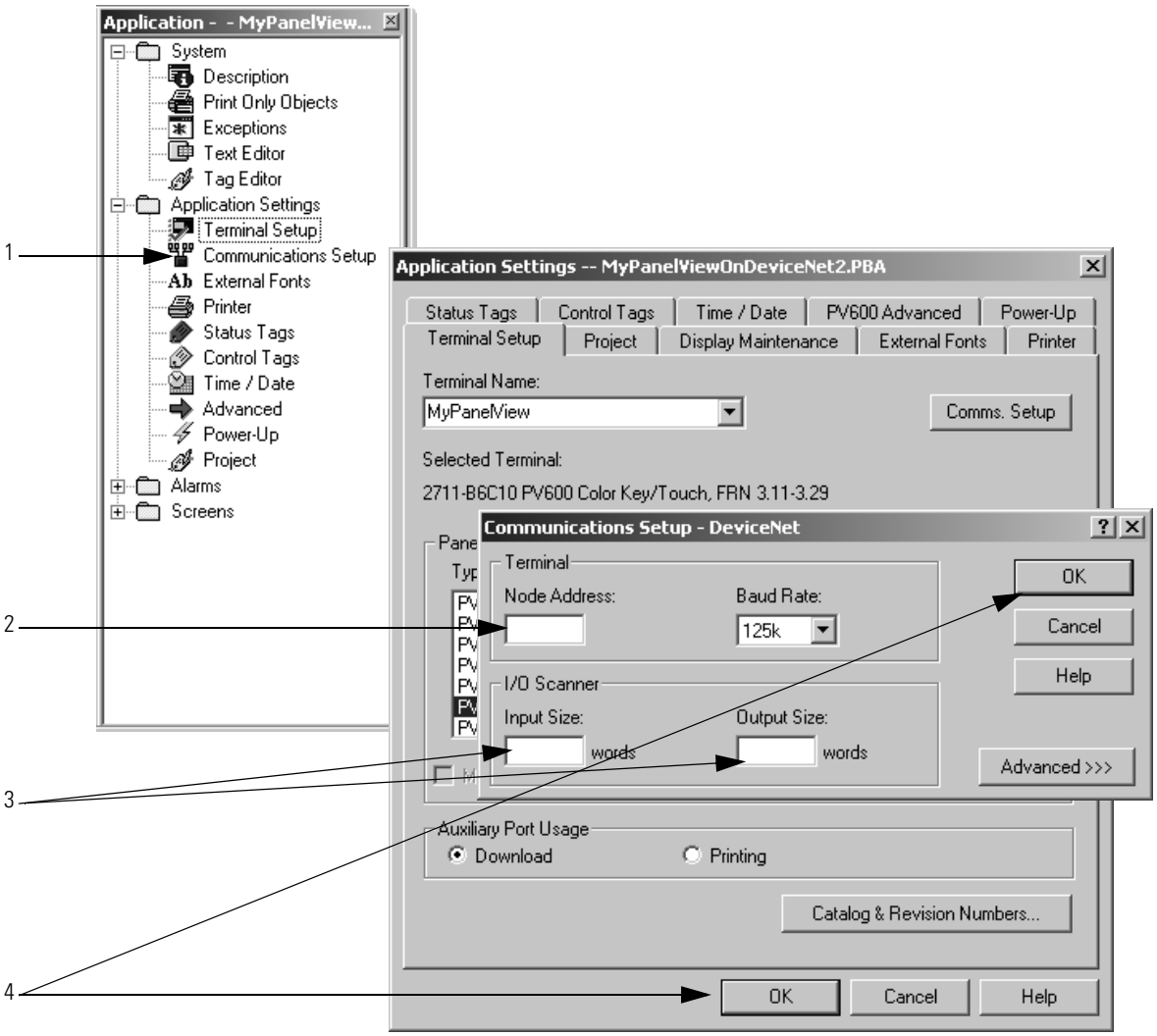
1. Double-click Terminal Setup.
2. Choose the auxiliary port usage.
3. Click OK.



Set the Node Address and I/O Sizes

Complete the following steps to set the node address and I/O sizes.

1. Double-click Communication Setup.
2. Type the address of the PanelView terminal.
3. Type the number of input words and output words that you will use (64 maximum each).
4. Click OK to close the dialog boxes.



Configure the Scanner to Update I/O Slave Tags

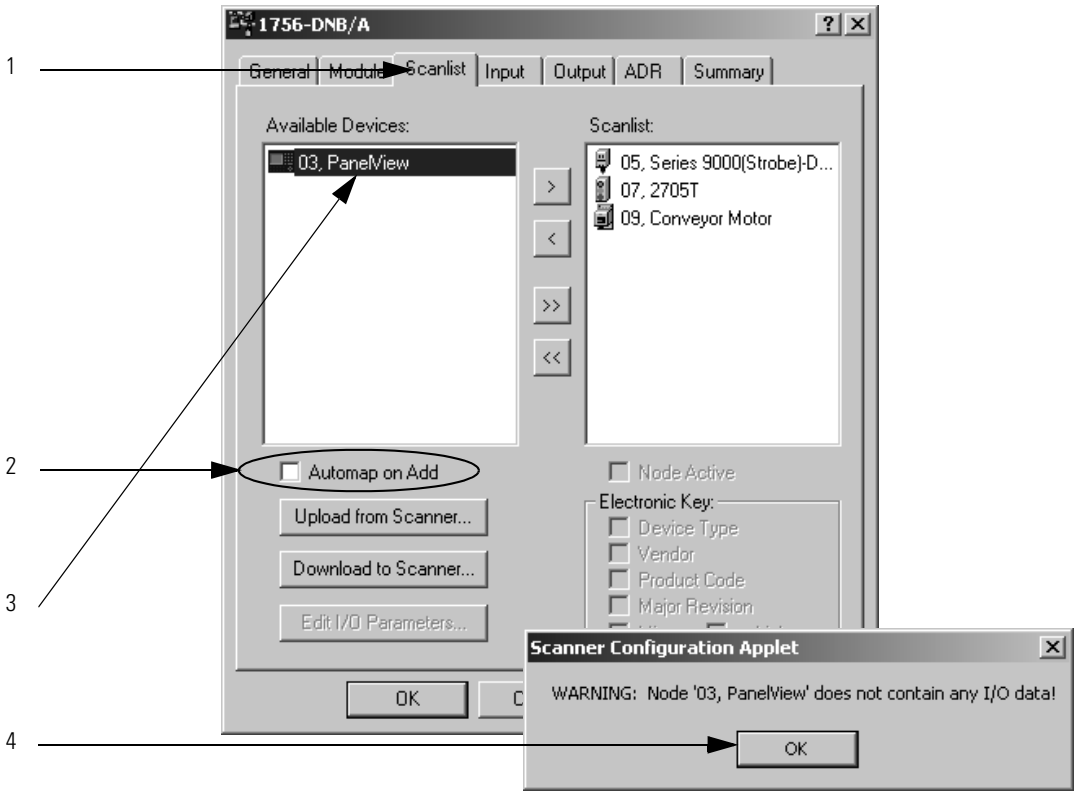
Complete the following tasks to access I/O slave tags and map the data to the input and output maps of the scanner:

- Add the Terminal to the Scan List
- Edit I/O Parameters
- Map Input and Output Data

Add the Terminal to the Scan List

Complete the following steps to add the terminal to the scanlist.

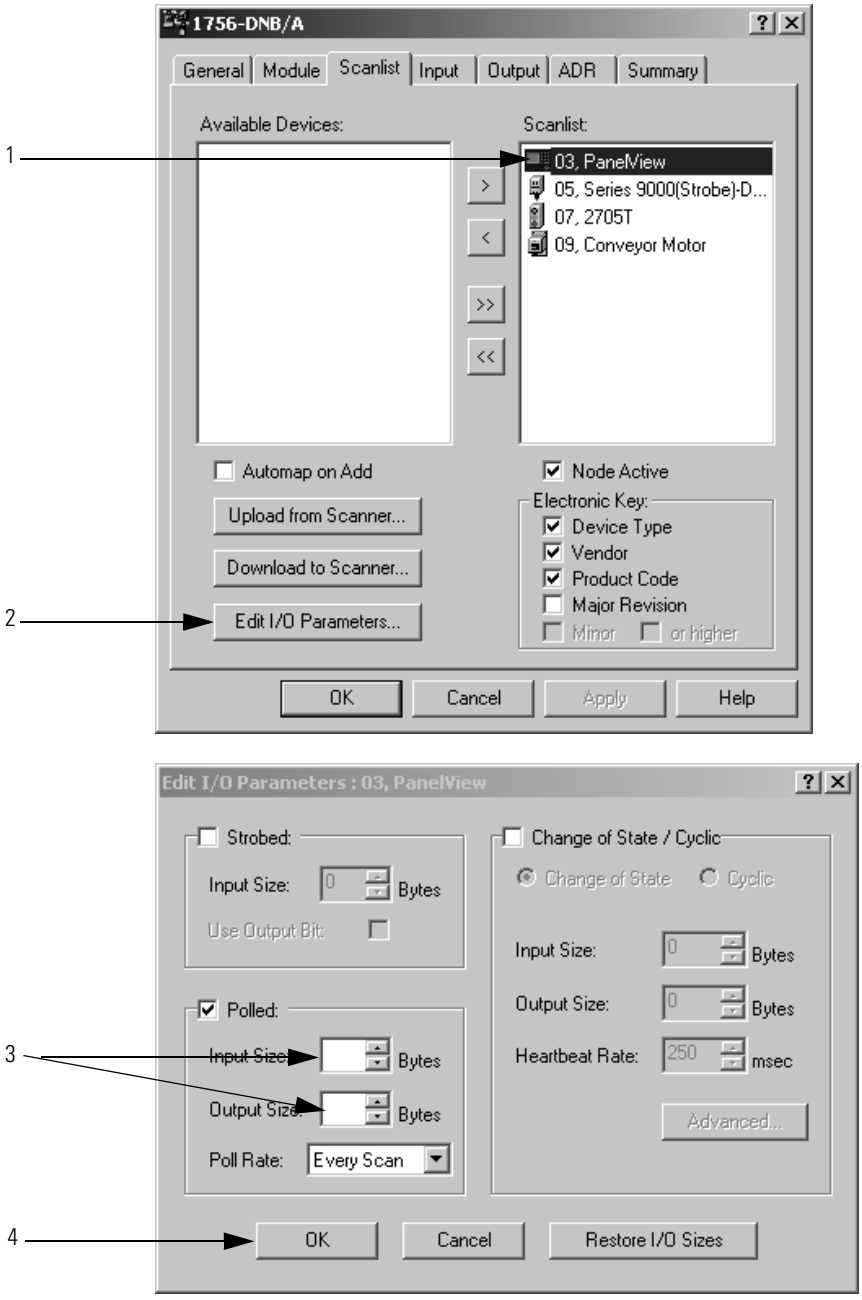
1. Click the Scanlist tab.
2. Clear Automap on Add.
3. Add the terminal to the scanlist.
4. Click OK.



Edit I/O Parameters

Complete the following steps to edit I/O parameters.

1. Select the terminals.
2. Click Edit I/O Parameters.
3. Enter the input and output sizes in bytes. Make sure each number is two times the number you entered in the communication set-up of the terminal (1 word = 2 bytes).
4. Click OK.

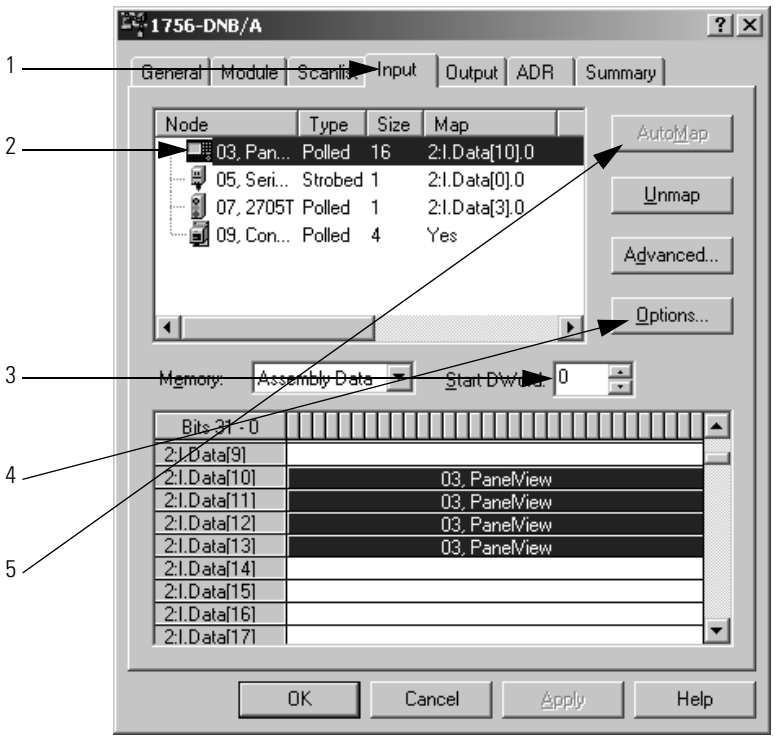


Map Input and Output Data

Complete the following steps to map input and output data.

1. Click the Input tab.
2. Select the terminal.
3. Enter the starting element for the data in the input array.
4. Set the alignment option (typically DWord align).
5. Click AutoMap.

   An entry for the device shows up in the input array.
6. Click the Output tab and repeat steps 2 through 5.



Address I/O Slave Tags in the RSLogix 5000 Programming Software Project

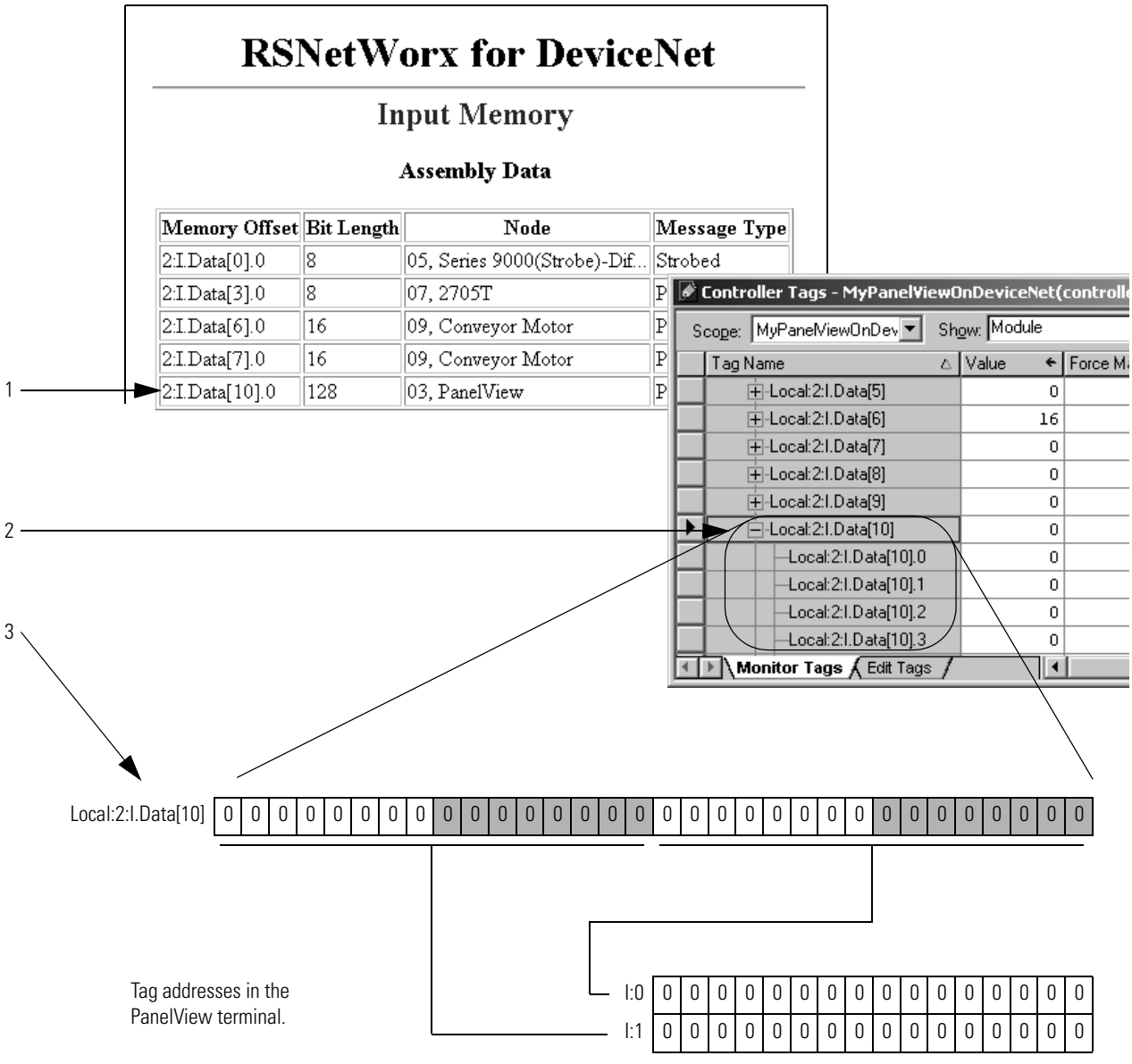
You must get the following information to find the data for an I/O slave tag in your RSLogix 5000 programming software project:

- RSNetWorx for DeviceNet report for the network
- Address for the tag in the PanelView terminal

Complete the following steps to get the information described previously.

1. On the report for the network, find the memory address for the PanelView terminal.
2. Find the corresponding tag in the controller-scoped tags of the controller.
3. Find the data within the controller tag.

   Use the tag address as a reference.



DeviceNet tags use the format described below.

Scanner Memory Format	Tag in Controller
slot:type.Data[element].bit	location:type.Data[element].bit

Where	Is		
Location	Location of the scanner in the system		
	If you have this scanner	**Then location is**	
	ControlLogix 1756-DNB	**In a**	**Location is**
		local chassis	Local:slot_number_of_scanner
		remote chassis	adapter:slot_number_of_scanner where: adapter is the name of the EtherNet/IP or ControlNet module in the remote chassis.
	CompactLogix 1769-SDN	Local:slot_number_of_scanner	
	SoftLogix 5800 1784-PCIDS		
	EtherNet/IP to DeviceNet Linking Device (1788-EN2DN)	The name of the scanner in the I/O configuration of the controller	
	ControlNet to DeviceNet Linking Device (1788-CN2DN)		
Type	Type of data:		
	Where	**Is**	
	Input from a device	I	
	Output to a device	O	
	Status of the network	S	
Element	A specific DINT (DWord, 32-bit integer) within the array		
Bit	A specific bit within an integer		

SoftLogix 5800 Controller

The SoftLogix 5800 scanner 1784-PCIDS organizes input and output memory in 16-bit words. It uses the following address format.

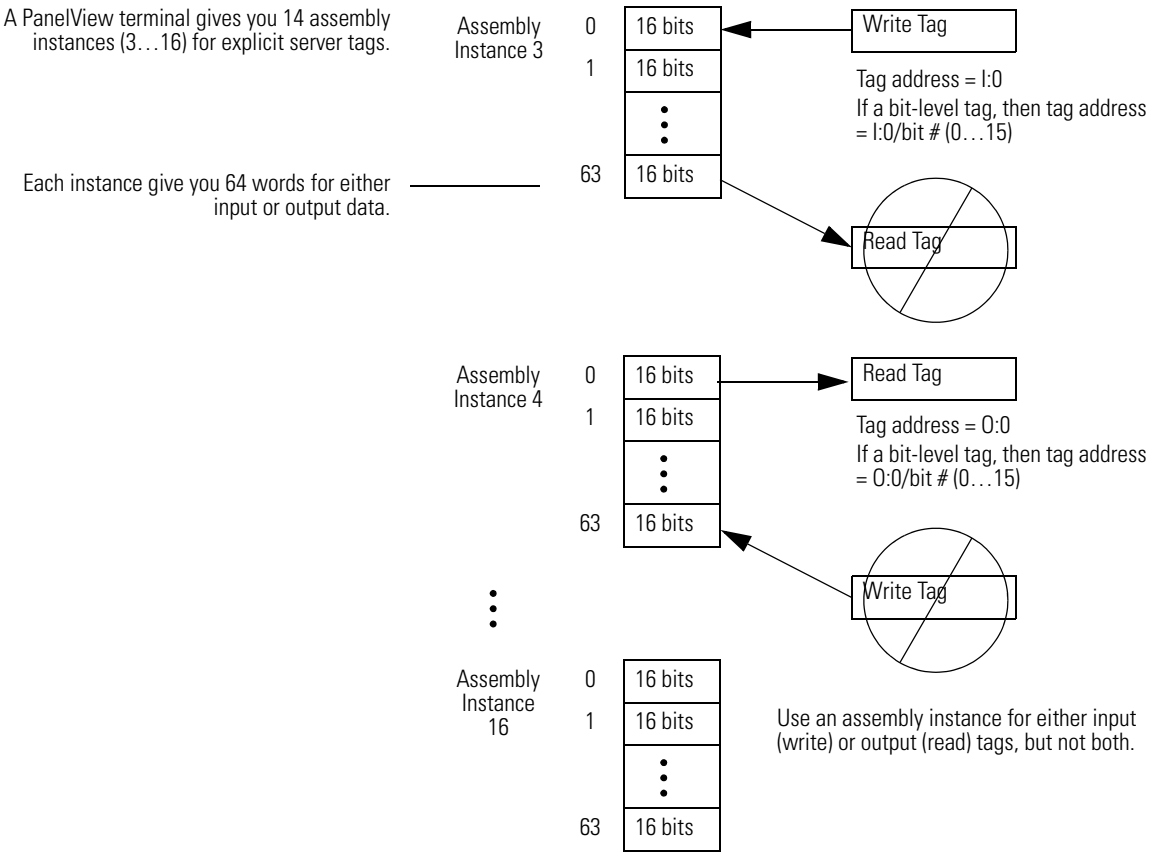
word.bit

Where	Is
Word	INT (16-bit integer) with the memory of the scanner
Bit	A specific bit within an integer

Plan and Configure Explicit Server Tags

Explicit server tags are similar to I/O tags except that the controller initiates the communication with the terminal. Explicit server tags **do not** show up on the input and output maps of the scanner.

Assign Assembly Instances



Determine how you will use each assembly instance.

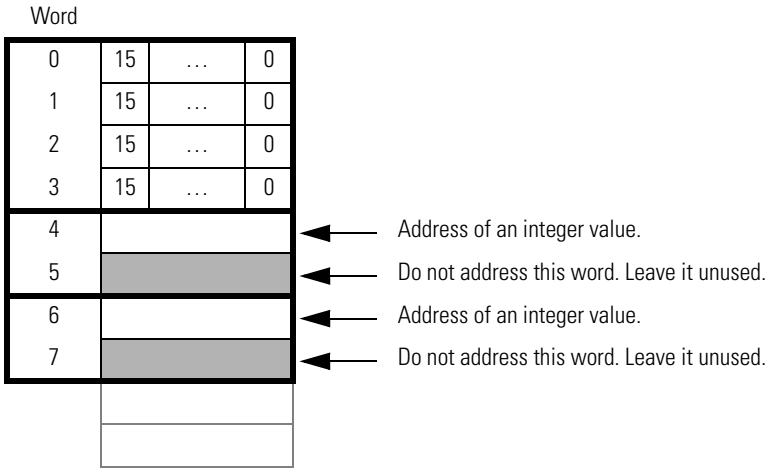
Instance Number	Input (Write) or Output (Read)	Instance Number	Input (Write) or Output (Read)
1	input	9	
2	output	10	
3		11	
4		12	
5		13	
6		14	
7		15	
8		16	

For Integers, Skip Every Other Word

Logix5000 controllers use 32-bit integers (DINTs). Complete the following steps to lay out your PanelView tags in a method that makes programming easier.

1. For bit-level tags, set aside an even number of words.
2. For each integer, set aside 2 words.

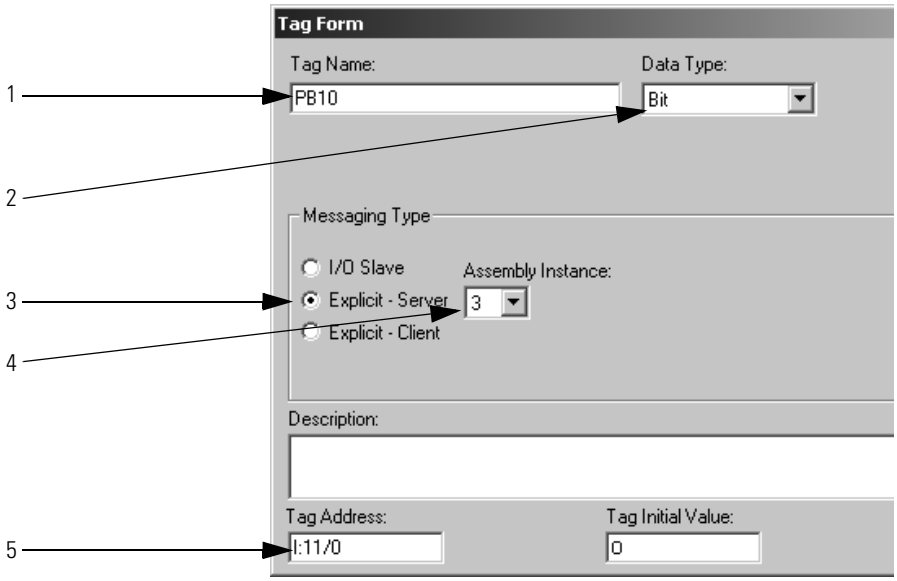
   Start each integer on an even word. This method lets each integer map to its own element in the scanner/controller.



Configure an Explicit Server Tag

Complete the following steps to configure an Explicit-Server tag.

1. Type a descriptive name for the tag.
2. Choose the data type for the tag.
3. Let the controller initiate the update.
4. Choose the assembly instance for the tag.
5. Assign an address for the tag within the assembly instance.
   - Write tag = I:word/bit
   - Read tag = O:word/bit



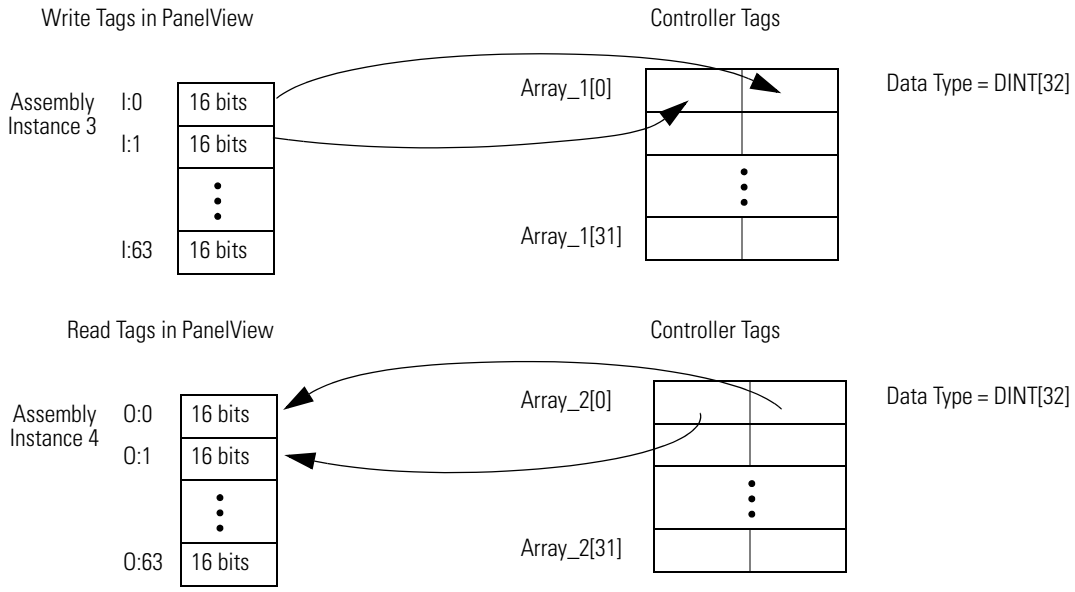
Program the Controller to Get/Set Explicit Server Tags

Complete the following tasks to let the controller read or write data from or to an Explicit-Server tag:

- Create an Array for the Assembly Instance
- Enter and Configure the MSG Instruction
- Set the Communication Path

Create an Array for the Assembly Instance

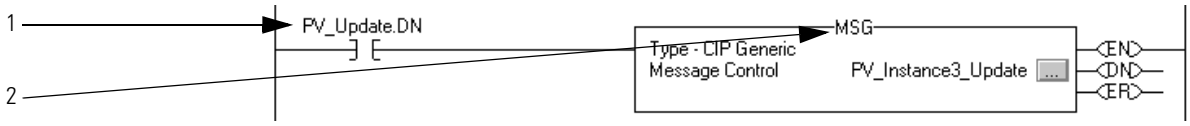
For each assembly instance that you use for explicit server tags, create an array in the RSLogix 5000 project for the data.



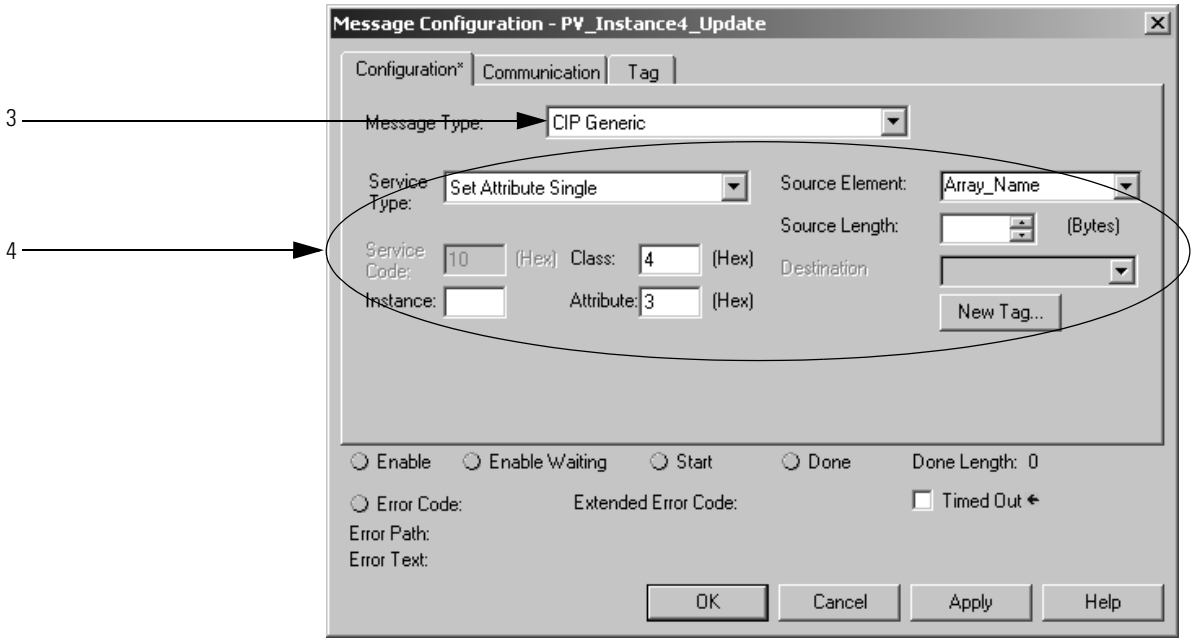
Enter and Configure the MSG Instruction

Complete the following steps to enter and configure the MSG instruction.

1. Enter a condition for the data transfer, such as the DN bit of a timer.
2. Enter a MSG instruction.

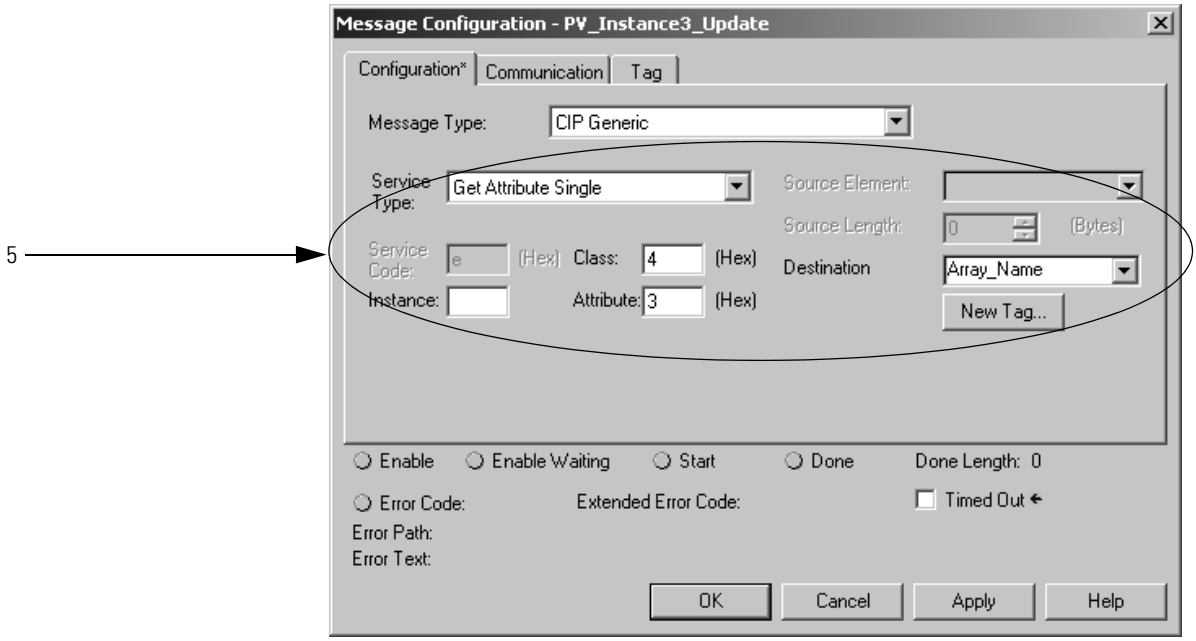


3. Select CIP Generic.
4. Complete the configuration to send output data.
   a. From the Service Type pull-down menu, choose Set Attribute Single.
   b. From the Source Element pull-down menu, choose the array that has the data.
   c. In the Source Length field, enter the number of bytes that you have addressed in the PanelView instance (words x 2).
   d. In the Class field, type 4.
   e. In the Instance field, type the assembly instance of the data in the PanelView terminal. Convert it to hexadecimal format.
   f. In the Attribute field, type 3.



5. Complete the configuration to get input data.
   a. From the Service Type pull-down menu, choose Get Attribute Single.
   b. From the Destination pull-down menu, choose the array to store the data.
   c. In the Class field, type 4.
   d. In the Instance field, type the assembly instance of the data in the PanelView terminal.

      Convert it to hexadecimal format.
   e. In the Attribute field, type 3.



Set the Communication Path

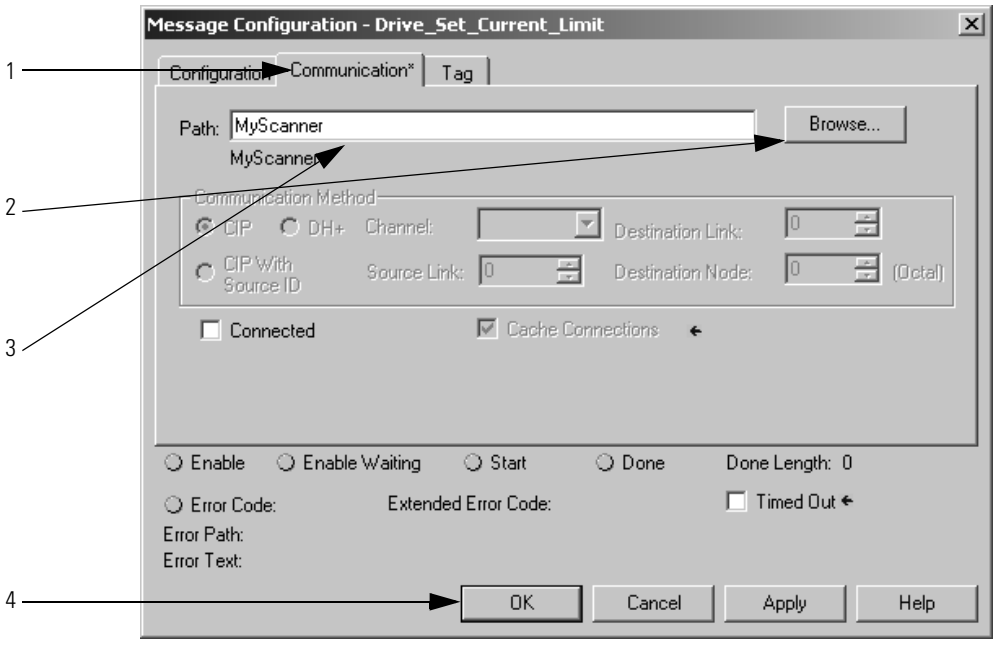
The communication path specifies the route to the PanelView terminal. A communication path uses the following format:

scanner_name,2,device_address

Where	Is
scanner_name	The name of the scanner in the I/O Configuration folder of the controller.
device_address	The address of the device on the DeviceNet network.

Complete the following steps to set the communication path.

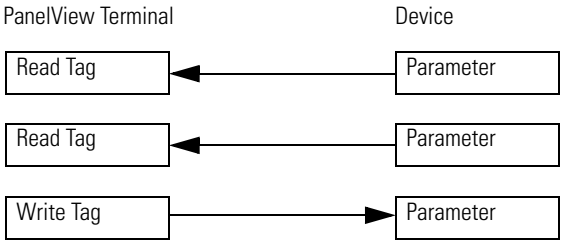
1. Click the Communication tab.
2. Click the Browse button and select the scanner.
3. Type the rest of the path.
4. Click OK.



For more information on programming MSG instructions, see the Logix5000 Controller General Instructions Reference Manual, publication 1756-RM003.

Configure Explicit Client Tags

Use an Explicit Client tag to let the PanelView terminal get or set a parameter of another device on the DeviceNet network.



An Explicit Client tag **does not** do the following:

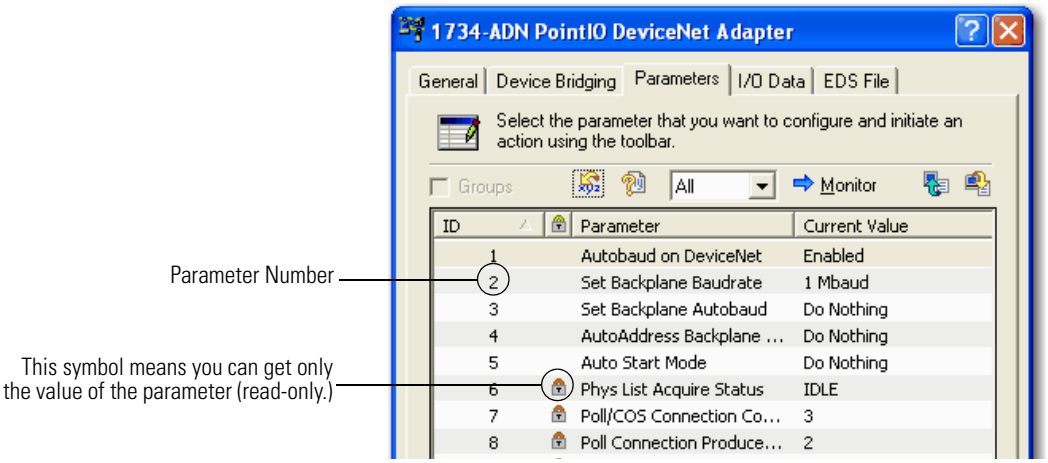
- Show up on the input or output map of the scanner
- Involve the controller
- Use an address in an assembly instance of the PanelView terminal

Complete the following tasks to configure Explicit Client tags:

- Determine the Parameter Number to Access
- Determine the Configuration of the Parameter
- Configure an Explicit Client Tag

Determine the Parameter Number to Access

Use RSNetWorx for DeviceNet software to determine the parameter number that you want to access. Some parameters are read-only and are shown with a lock symbol.

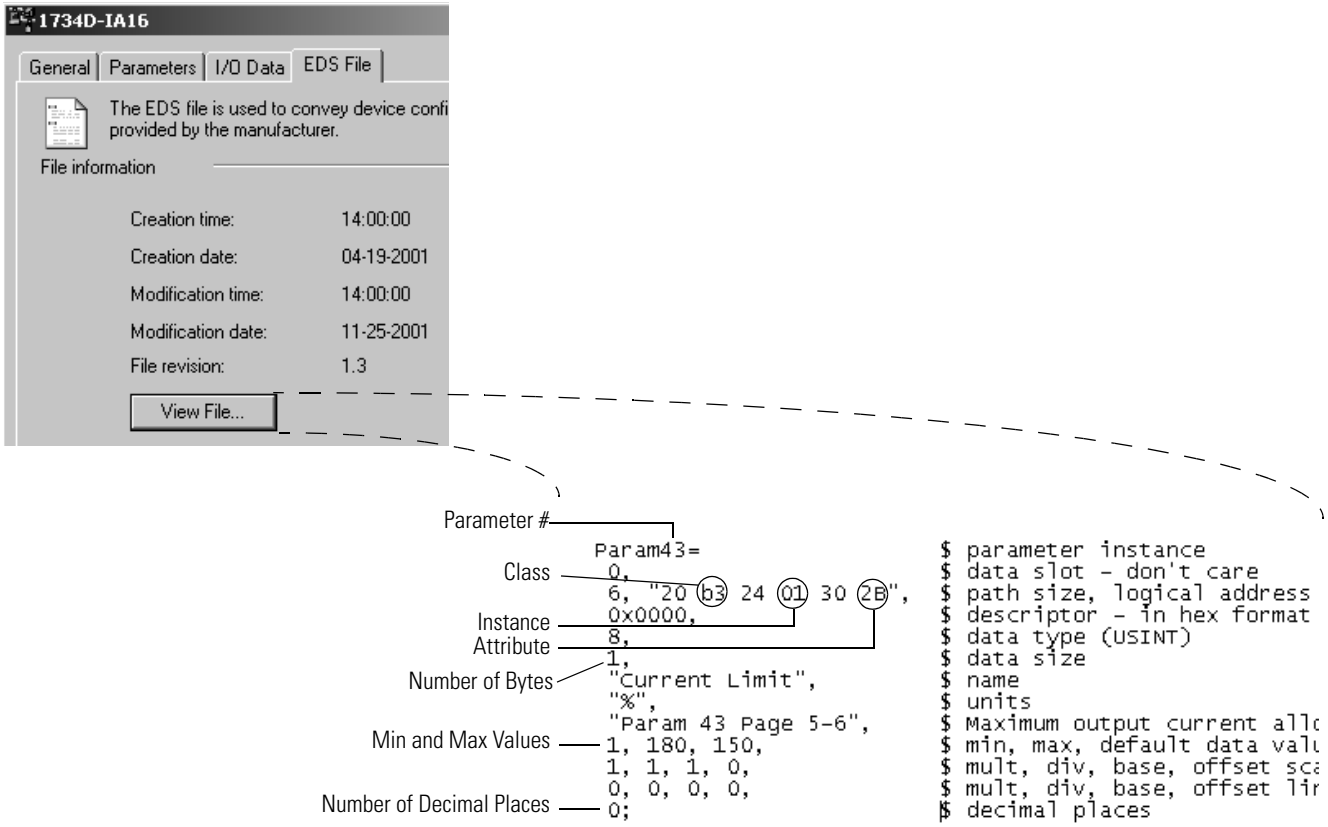


Determine the Configuration of the Parameter

Find the information about the parameters listed in the following table to get or set a parameter.

Item	Value
Class # (hex)	
Instance # (hex)	
Attribute # (hex)	
Number of bytes (size)	
Minimum value	
Maximum value	
Decimal places Some devices assume a specific number of decimal places in a value.	

In addition to the documentation for the device, the EDS file may also give you the required information.

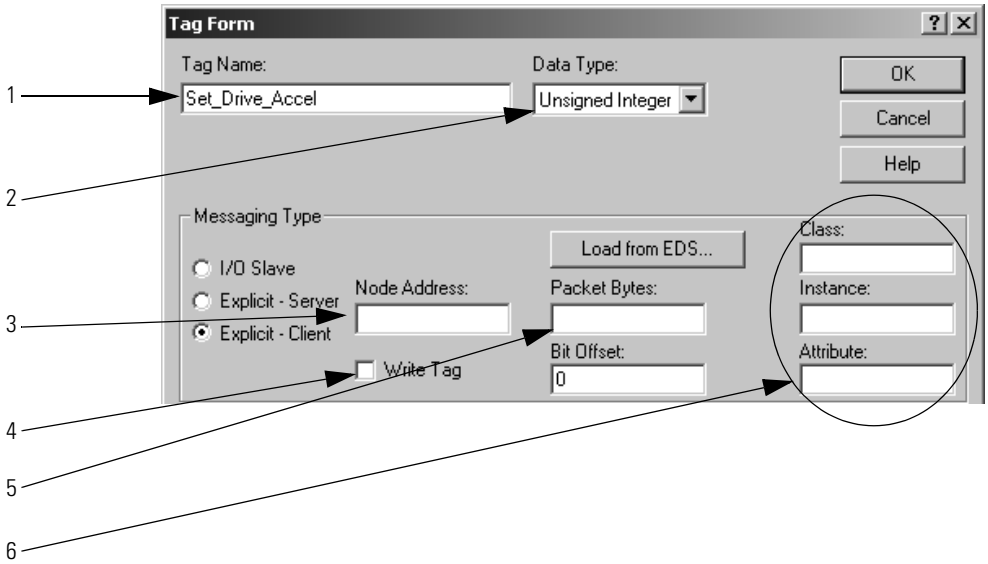


Configure an Explicit Client Tag

Complete the following steps to configure an Explicit Client tag.

1. Type a descriptive name for the tag.
2. Choose the data type for the tag.

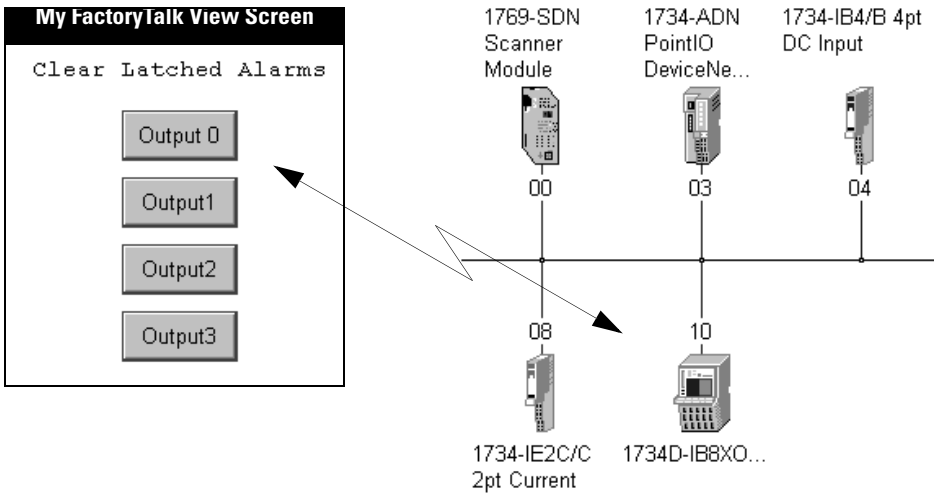
   Let the PanelView terminal initiate the update.
3. Type the address of the device.
4. If the PanelView terminal sets the parameter, check the Write Tag box.
5. Type the number of bytes in the parameter.
6. Type the class, instance, and attribute numbers for the parameter.



Communicate with a FactoryTalk View Project

This chapter describes how use a FactoryTalk View project to get or set a parameter of a DeviceNet communication module.

Topic	Page
Before You Begin	155
Create a Topic for the Device	156
Create a Node	158
Create a Tag for the Parameter	159



IMPORTANT Once you add a device to the scan list of a scanner, HMI software such as FactoryTalk View **cannot** write to (set) **some** parameters.

```
$ Output state
Param25 = $ Value for Output #0
    0,                                  $ reserved
    6,                                  $ Link Path Size
    "20 09 24 01 30 03",                $ Link Path to DOP object's value attribute.
    0x0022,                             $ No support for: settable path, scaling, scaling
                                        $ Real time update of value.  Value is gettable ar
    4,                                  $ Data Type - boolean
    1,                                  $ Data Size
    "Output Value #0",                  $ Parameter Name
    "",                                 $ Units String
    "Value of output point.'ON' or 'OFF'\nNOT SETTABLE when I/O conection is established."
    0,1,0,                              $ Min, Max (max enumeration #), and Default values
    1,1,1,0,0,0,0,0,0;                  $ Not Used
```

Once this device is in the scan list of the scanner, a FactoryTalk View project cannot set this parameter.

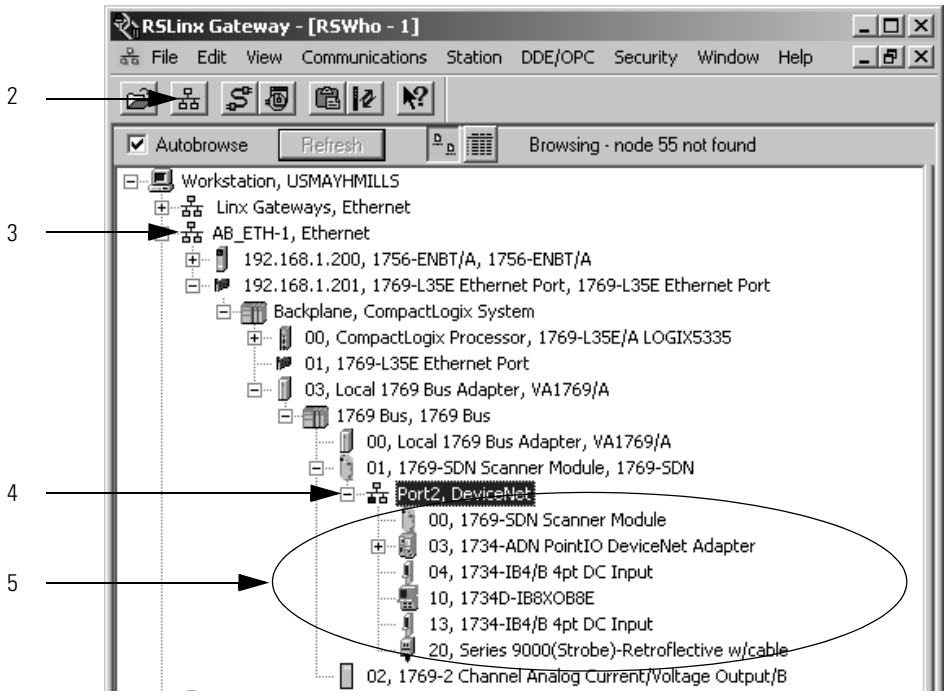
To access the DeviceNet network, either connect the computer with the FactoryTalk View application to any of the following networks:

- Same DeviceNet network as the desired device
- EtherNet/IP or ControlNet network and bridge communication to the DeviceNet network
  - Avoid bridging through a 1768 or 1769 CompactLogix controller, or DriveLogix controller. They have limited resources for bridging.
  - For the controllers mentioned in the previous bullet, use the I/O tags in the controller, if possible.

Before You Begin

Before you use this chapter, make sure that you can see all your devices on the DeviceNet network. Complete the following steps to see your DeviceNet network.

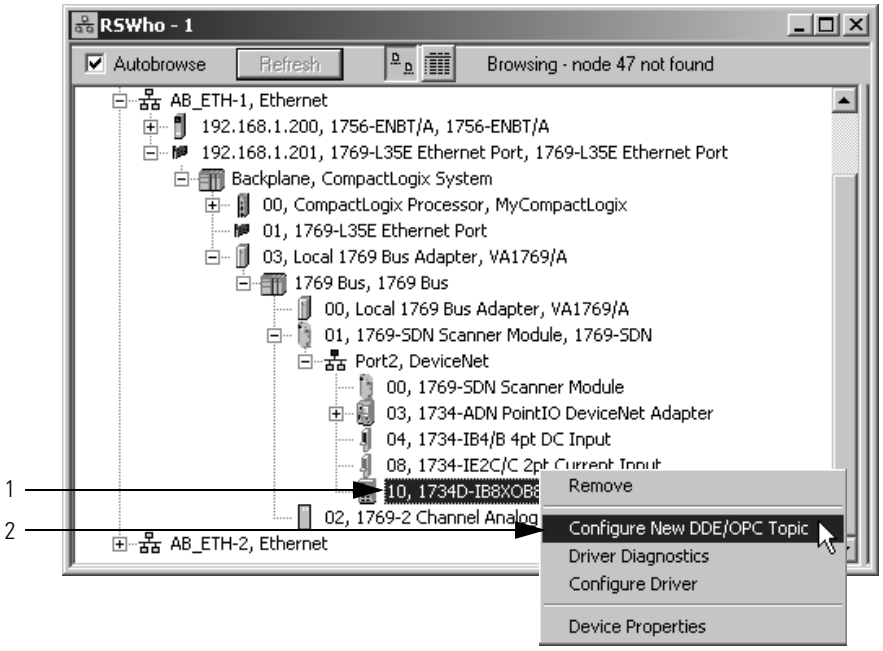
1. Start RSLinx communication software.
2. Browse the network.
3. Expand a driver that lets you access the DeviceNet network.
4. Select the DeviceNet network.
5. Verify that you see all the devices that are connected to the DeviceNet network.



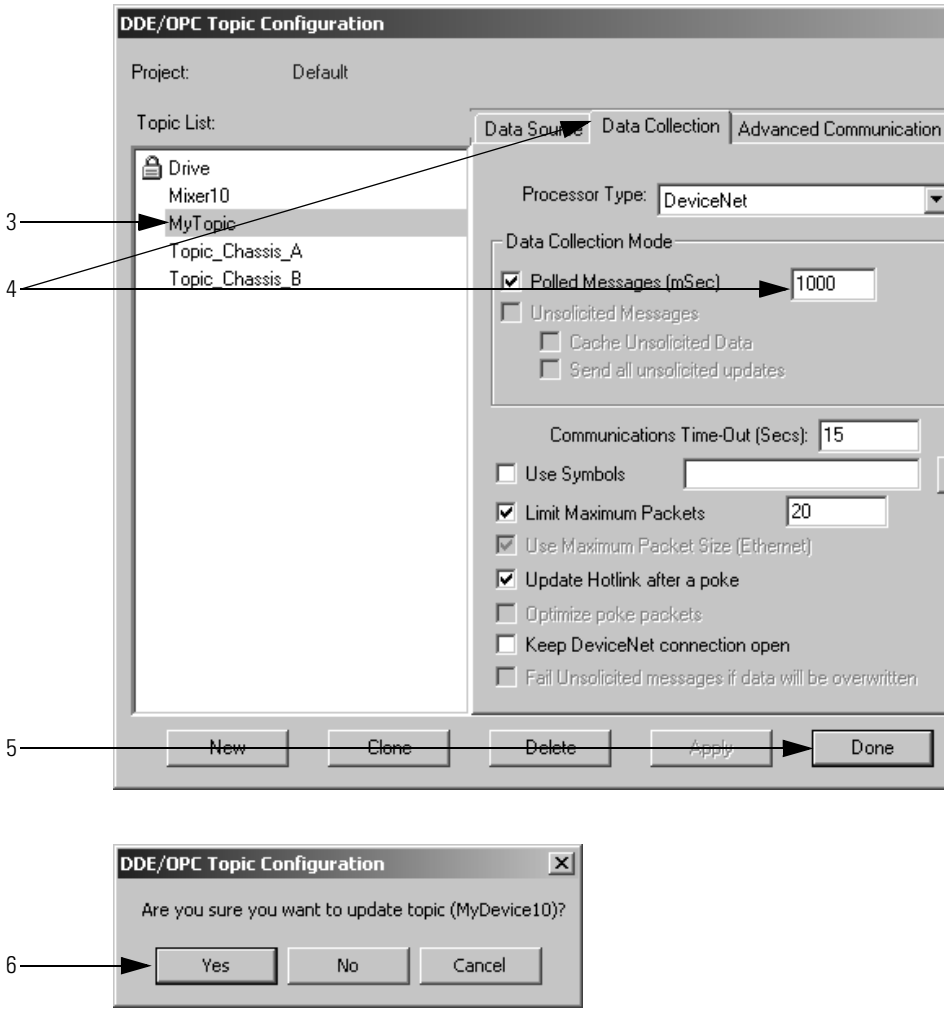
Create a Topic for the Device

Use RSLinx communication software to create a topic for the DeviceNet communication module that you want to access. Complete the following steps to create a topic for the device.

1. In RSLinx communication software, browse to the device that you want to access.
2. Right-click the device and choose Configure New DDE/OPC Topic.



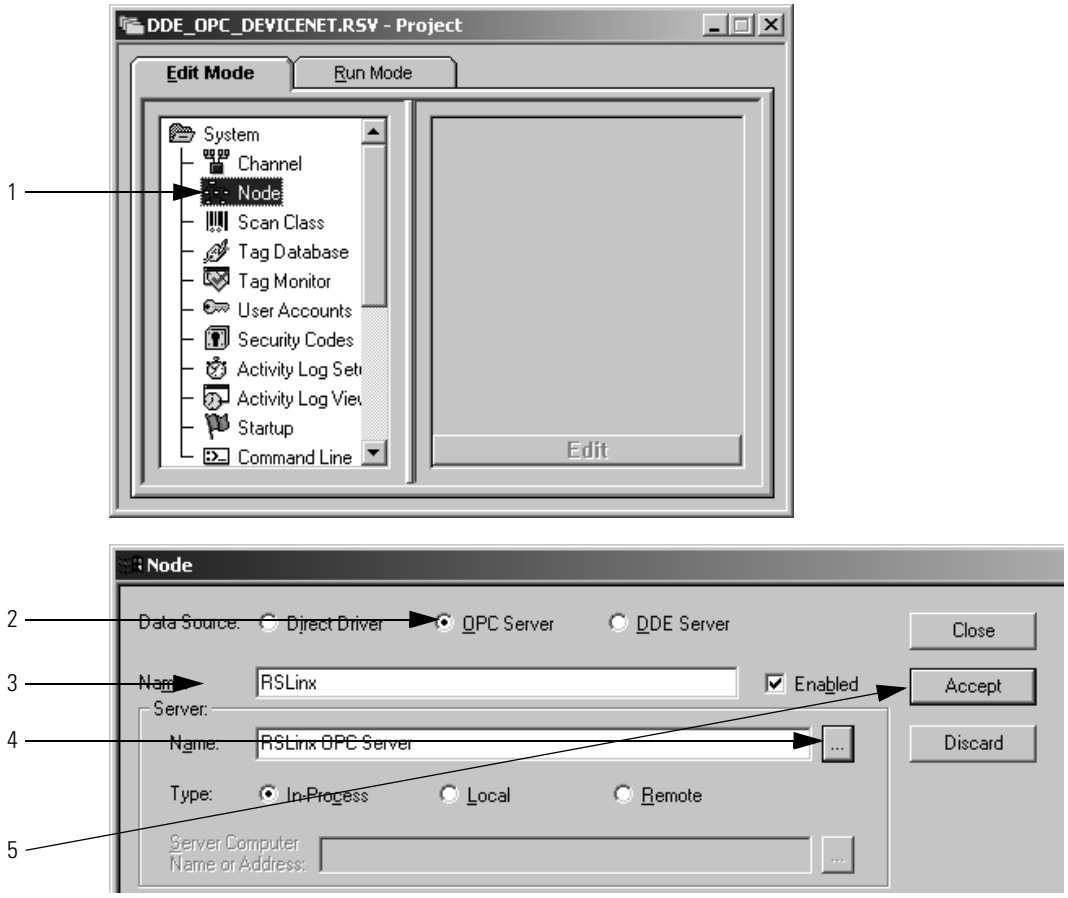
3. Type a name for the topic.
4. To change how often RSLinx communication software updates the tag, click the Data Collection tab and type a new poll period.
5. Click Done.
6. When prompted, click Yes to update the topic.



Create a Node

In the FactoryTalk View project, create a node for your RSLinx topics. Complete the following steps to create a node.

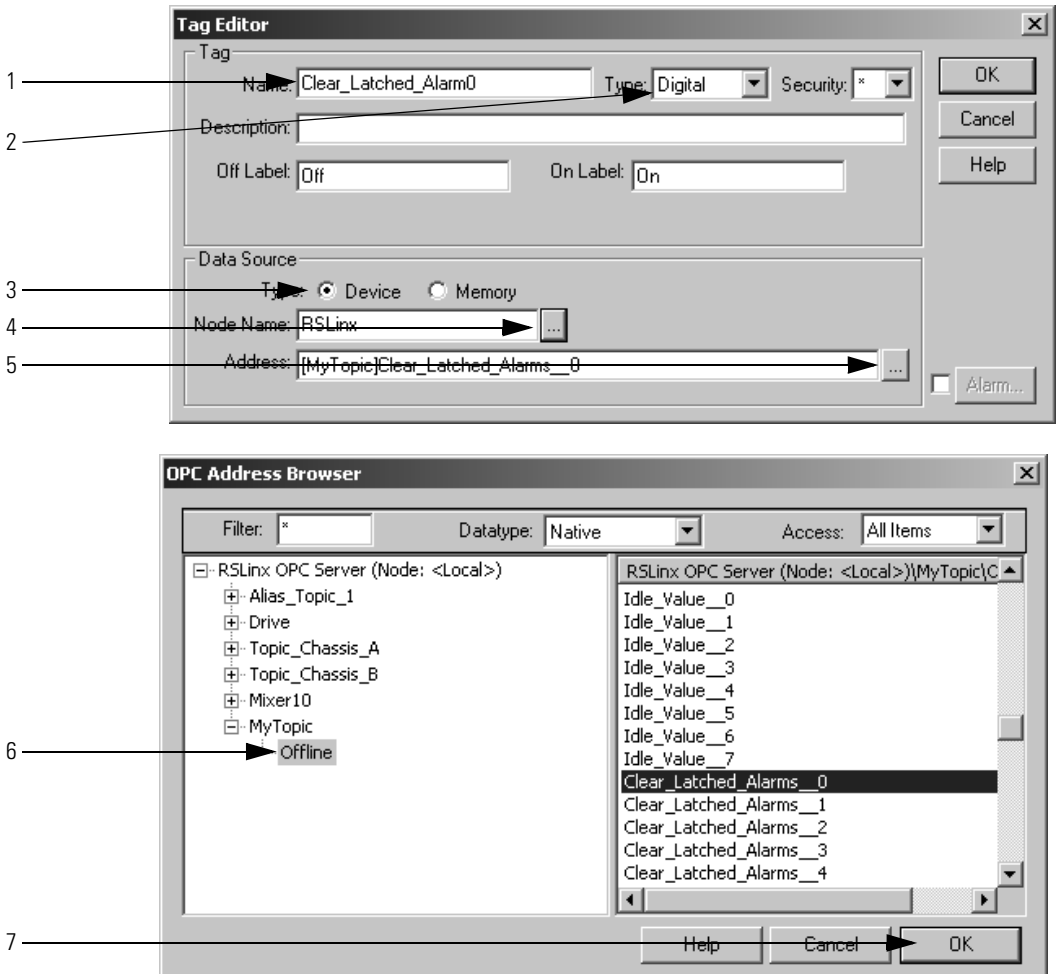
1. Open the list of nodes for the project.
2. Choose OPC Server.
3. Type a name for the node.
4. Select RSLinx.
5. Click Accept.



Create a Tag for the Parameter

Complete the following steps to create a tag for the parameter in FactoryTalk View software.

1. Type the name of the tag.
2. Choose the type of tag.
3. Choose Device.
4. Select the node that contains the topic for the device.
5. Open the address browser.
6. Browse to the offline list of tags for the topic, that is, device.
7. Select the parameter and click OK.



Notes:

Tune the Performance of a DeviceNet Network

This chapter describes how to improve the performance of the network.

Topic	Page
Factors that Affect Performance	162
Change the Configuration of Your Network	165

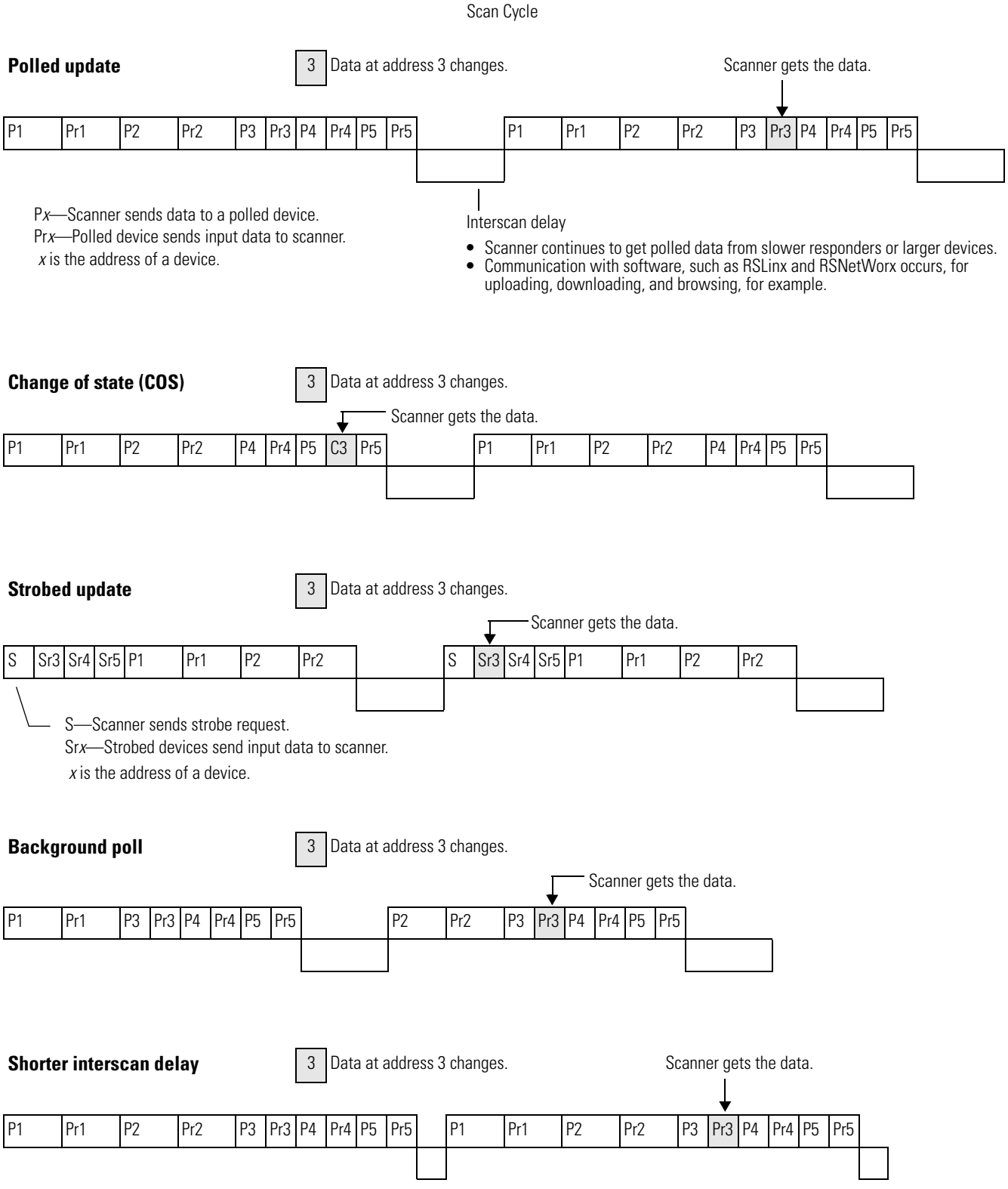
As you configure and program the network, use the default settings whenever possible. Once the network is running, determine if you need to improve performance.

To improve the performance of the network, consider the information in the following table.

If	Then
A specific device requires a faster update	Change the I/O parameters of the device to change of state (COS).
An analog device does **either** of the following: • Changes slower than the scan cycle • Requires a repeatable update period, such as for PID calculations	Change the I/O parameters of the device to cyclic.
Multiple devices are input only **and** I/O parameters are currently set to polled with an input size less than or equal to 8 bytes	For each of those devices, change their I/O parameters to strobed.
Two or more devices send or receive large amounts of data, such as the PanelView operator terminal	• For each of those devices, set their I/O parameters to polled with a poll rate = background. • For the scanner, set the poll ratio = 2. Increase the poll ratio if needed.
Communication intermittently stops (status code 78) with a device that sends or receives large amounts of data, such as the PanelView operator terminal, **and** has the I/O parameters currently set to polled	Increase the interscan delay.

Factors that Affect Performance

The following example shows how different I/O or network parameters affect the performance of the network.



I/O Parameters of Each Device

The type of connection (message) that you configure for a device determines when data transfers between the device and the scanner. Consider the following points when you configure the type of connection:

- Each device has a default connection type. This is a good starting point.
- Some devices may not offer all connection (message) types.

The following table describes the different types of connections (messages) that you can configure for a device.

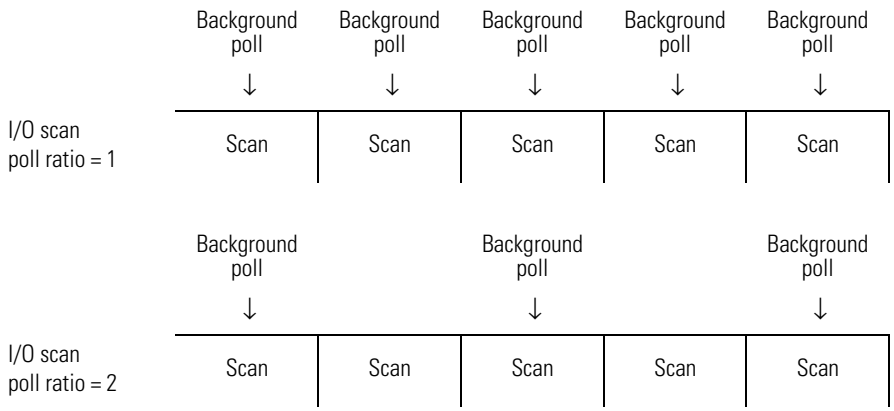
Connection (Message) Type	Description
Cyclic	Data transfers at the period that you specify. The default range is 48…32,000 milliseconds.
Change of state (COS)	Both the scanner and the device sends data whenever the data changes. You also specify a heartbeat period for the connection. • If the data does not change within the heartbeat period, the scanner or device sends the data at the end of the period. • This lets both the scanner and device know that the other is still operational.
Strobed	The scanner sends a single strobed request to solicit data from the strobed devices. • The request is 64-bits long (1 bit for each node). • In response to the request, each device that is configured for a strobed connection sends its data up to 8 bytes.
Polled	A point-to-point data transfer that occurs every I/O scan or as a ratio of the I/O scan (background). • At the specified poll rate (every scan or background), the scanner sends data to a polled device up to 255 bytes. The data is either output data for the device or a request for input data from the device. • If the polled device gets a request for input data, it sends its input data up to 255 bytes.

Background Poll

The foreground to background poll ratio lets you adjust how often the scanner polls certain devices for their data. In general, use the default values. Change them only if you need to tune the performance of your system.

Parameter	Description	Default Setting
Poll rate	• Applies to a device with a polled connection. • Defines whether the scanner polls the device every I/O scan (foreground) or as a ratio of the I/O scan (background).	Every scan
Foreground to background poll ratio	• Applies to devices with a polled connection that is configured for a background poll rate. • Determines how often the devices are polled. • By default, the scanner performs background polls every scan (poll ratio = 1).	1

The following diagram shows the effect of a change to the poll ratio.



IMPORTANT When using a foreground to background poll ratio other than 1, the total network time-out value of the EPR may need to be increased so the background devices do not time out.

The expected packet rate (EPR) defaults to 75, which is then multiplied by 4 ms to get a 300 ms timeout for a polled/strobed I/O connection.

Interscan Delay

The interscan delay determines how long the scanner waits before it starts another I/O scan. Follow these guidelines:

- In general, leave the interscan delay at its default value. Change it only if you need to tune the performance of your system.
- Keep the interscan delay ≥ 5 ms. Otherwise, you may have trouble accessing the network.

Parameter	Description	Default Setting
Interscan delay	• Last segment of the I/O scan. • Starts after the last packet of the poll to the last node in the scanner's scan list. • Provides time for larger devices and slower responders to return their polled data. • Provides time for software, such as RSLinx and RSNetWorx, to access the network for uploading, downloading, and browsing, for example. • Scanner waits for the interscan delay before it strobes or polls devices again. • A shorter interscan delay may improve the update time of strobed or polled data.	10 ms

Change the Configuration of Your Network

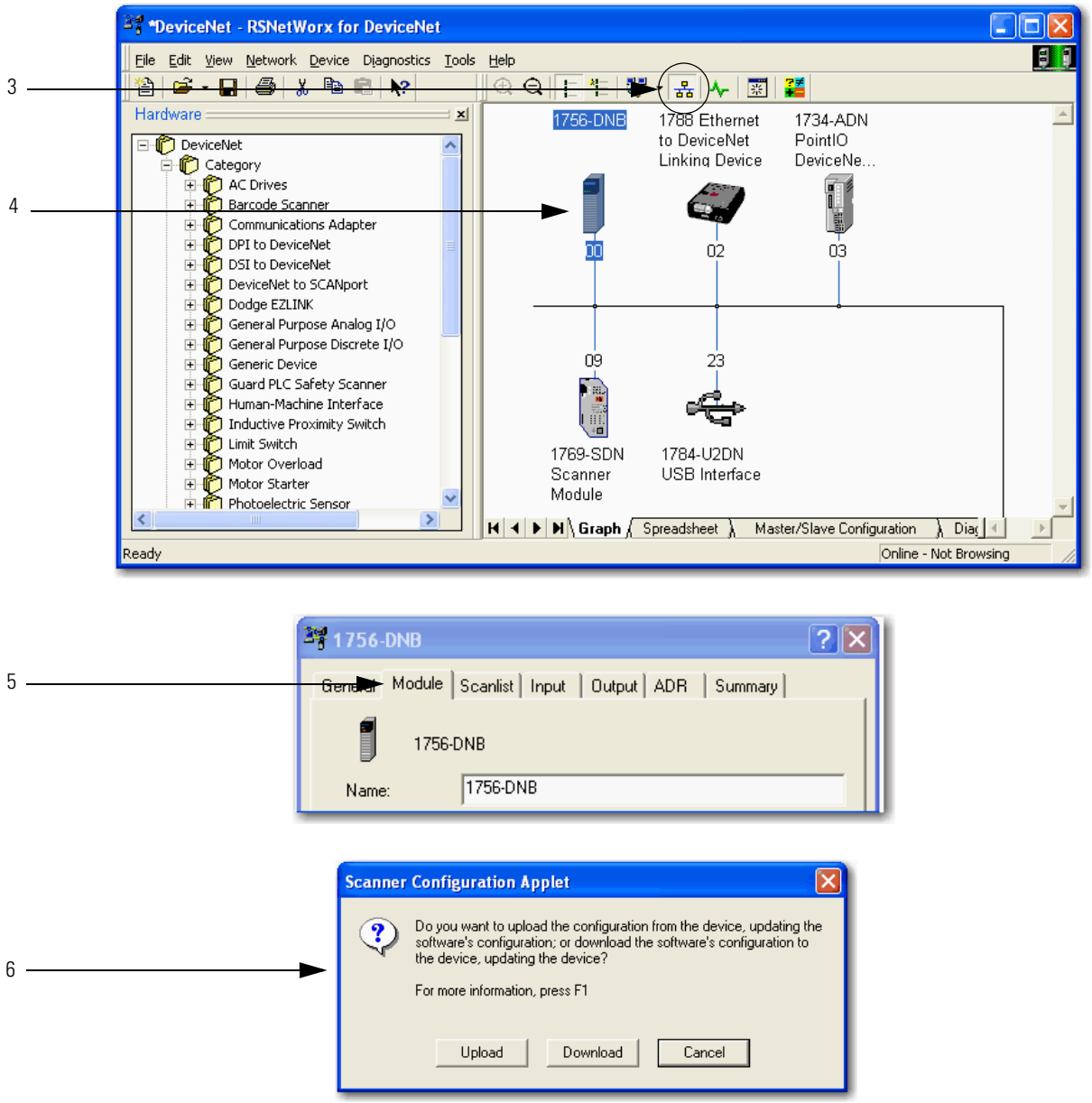
Complete these tasks to change the configuration of the network with RSNetWorx for DeviceNet software:

- Upload the Current Configuration of the Scanner
- Set the Interscan Delay and Poll Ratio
- Set the I/O Parameters of a Device
- Download the Configuration to the Scanner
- Save the Configuration File

Upload the Current Configuration of the Scanner

Complete these steps to upload the current configuration.

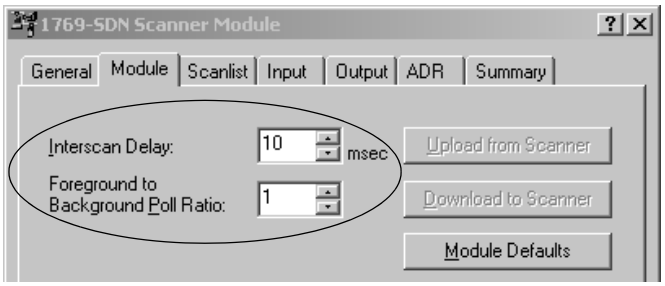
1. Start RSNetWorx for DeviceNet software.
2. If necessary, open the file for the network.
3. Go online.
4. Double-click the scanner.
5. Click the Module tab.
6. Click Upload from Scanner.
7. When prompted, upload the configuration from the scanner.



Set the Interscan Delay and Poll Ratio

Change the parameters shown below if needed.

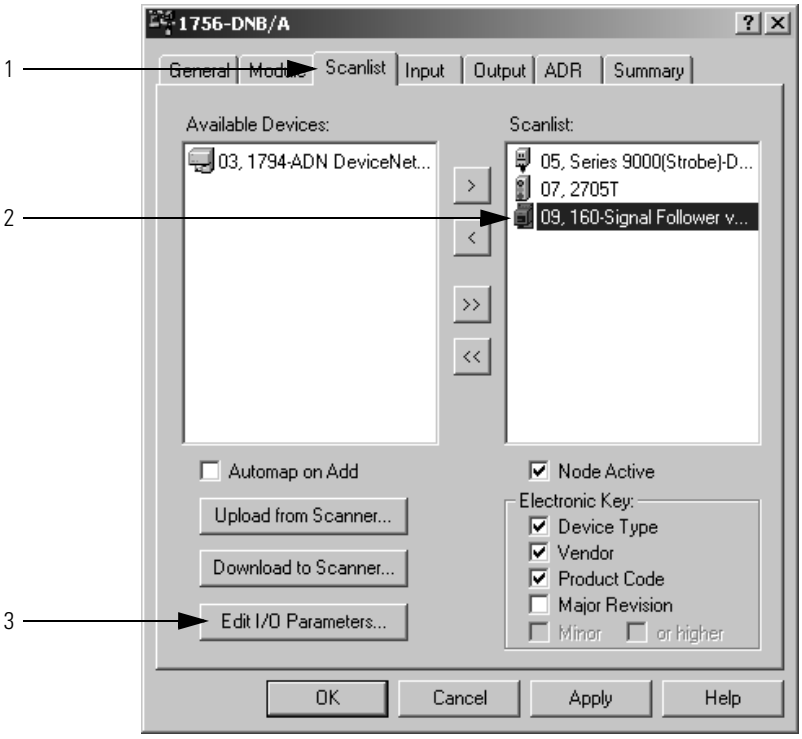
- For information on changing the Interscan Delay parameter, refer to page 165.
- For information on changing the Foreground to Background Poll Ratio parameter, refer to page 164.



Set the I/O Parameters of a Device

Complete these steps to set the I/O parameters of a device.

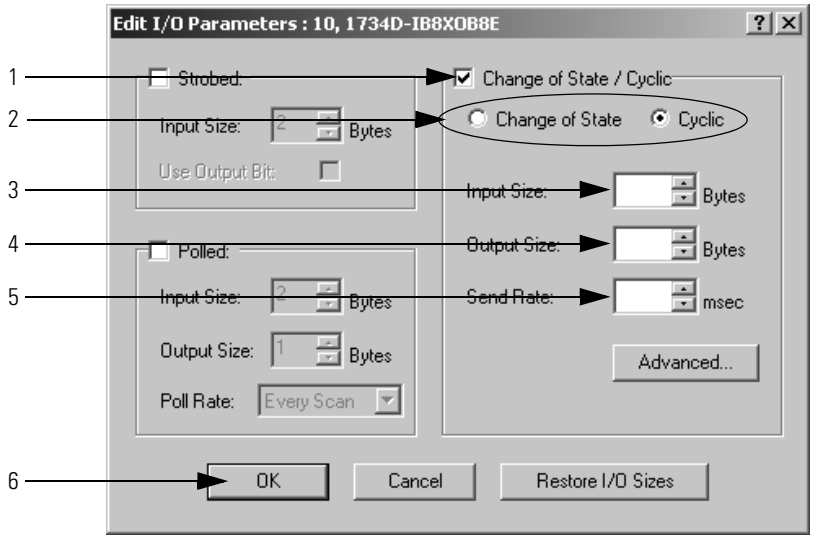
1. Click the Scanlist tab.
2. Select the device.
3. Click Edit I/O Parameters to display the Edit I/O Parameters dialog box.



Change of State or Cyclic Transfer

Complete these steps to configure the I/O parameters for the Change of State setting.

1. Check Change of State/Cyclic checkbox.
2. Click the Change of State or Cyclic option.
3. Enter the number of bytes that the devices sends to the controller.
4. Enter the number of bytes that the controller sends to the device.
5. For a cyclic update, enter the period of the update.
6. Click OK.

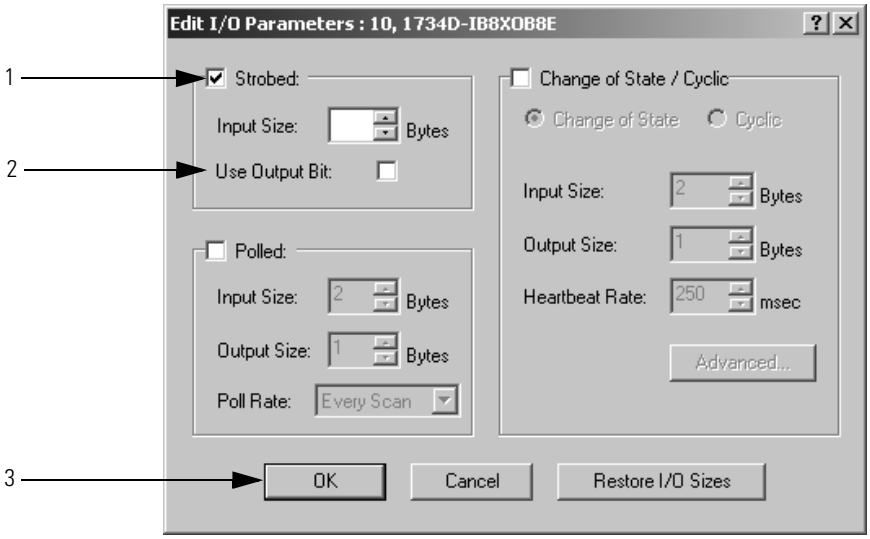


Strobed Transfer

Complete these steps to configure the I/O parameters for the Strobed Transfer setting.

1. Check Strobed.
2. If the single bit being sent to the strobed device needs to be accessed by the Logix controller, check Use Output Bit.

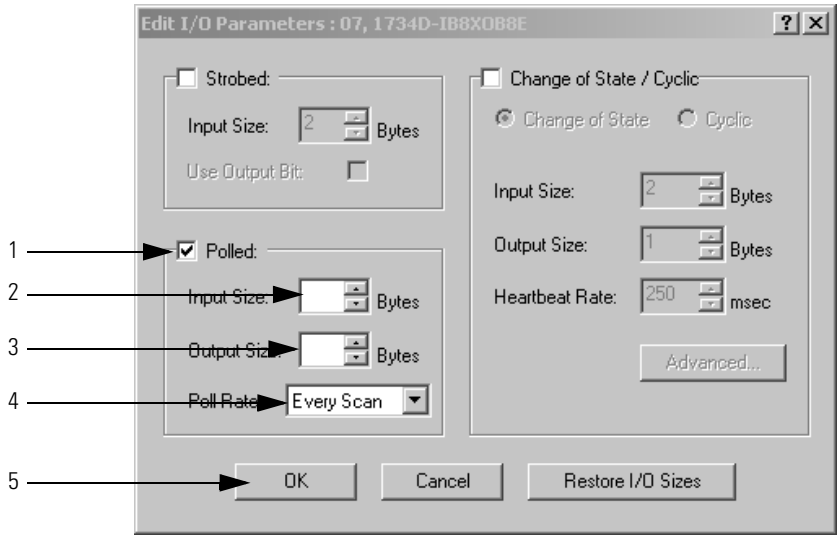
   This lets you map the bit into the I/O data being transferred with the controller.
3. Enter the number of bytes that the device sends to the controller.
4. Click OK.



Polled Transfer

Complete these steps to configure the I/O parameters for the Polled setting.

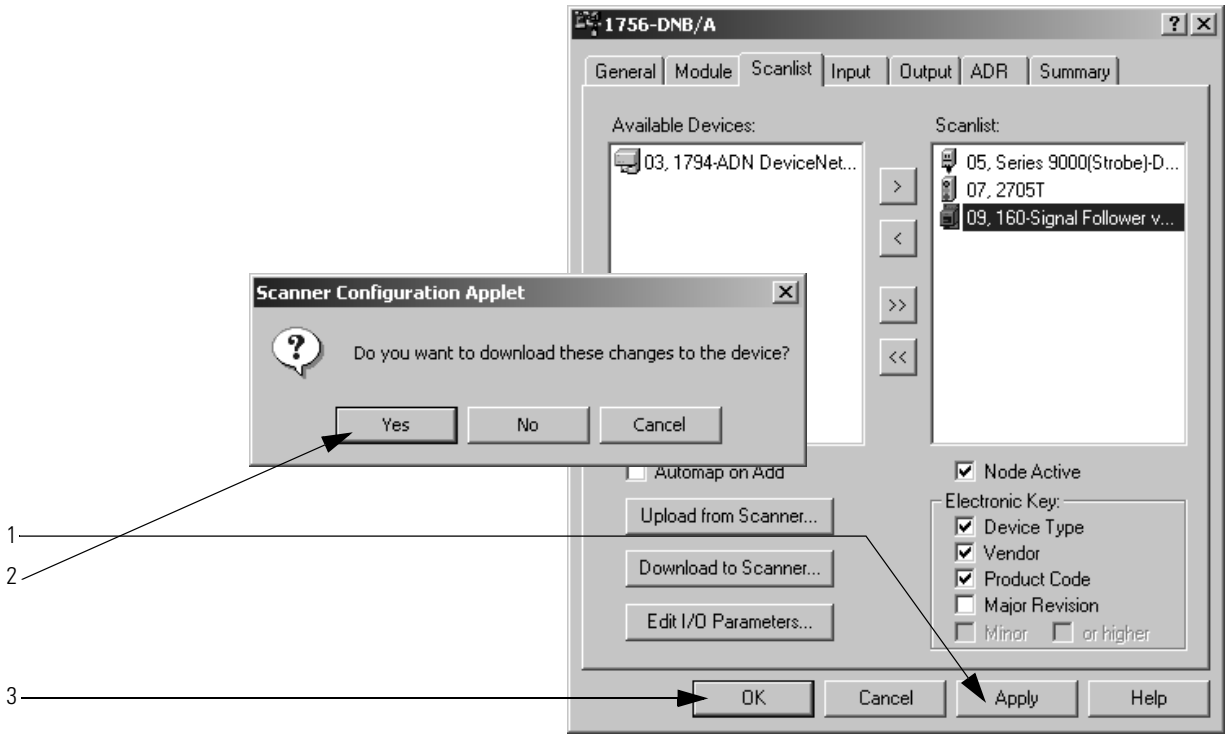
1. Check Polled.
2. Enter the number of bytes that the device sends to the controller.
3. Enter the number of bytes that the controller sends to the device.
4. Choose whether to poll the device every scan or in the background.
5. Click OK.



Download the Configuration to the Scanner

Complete these steps to download the configuration to the scanner.

1. Click Apply.
2. When prompted, click Yes to download the changes.
3. Click OK.

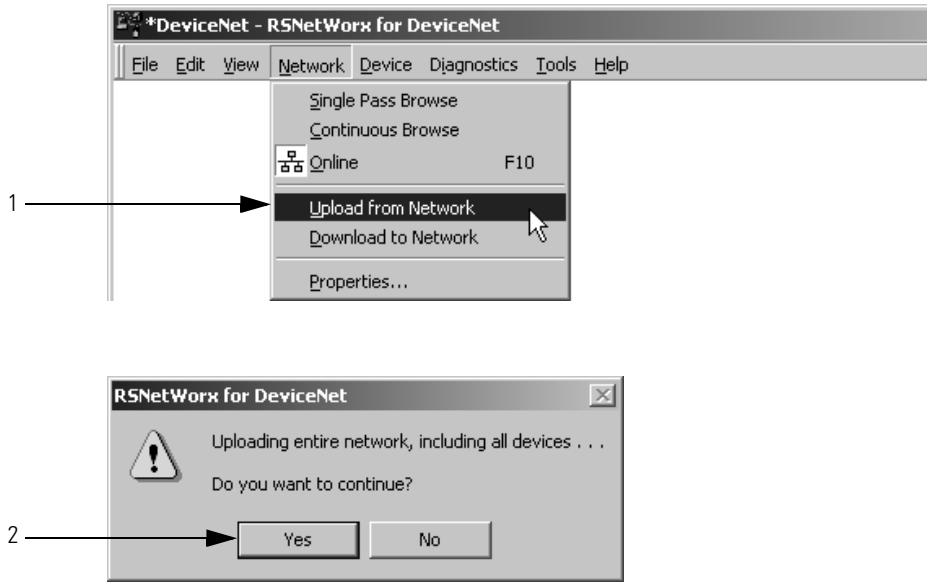


Save the Configuration File

After you make a change to the network, upload the entire network and save the file. This makes sure that the offline configuration file matches the network.

Complete these steps to save the configuration file.

1. From the Network menu, choose Upload from Network.
2. When prompted, click Yes to upload the entire network.
3. Save the file.



Automate the Replacement of a Failed Device

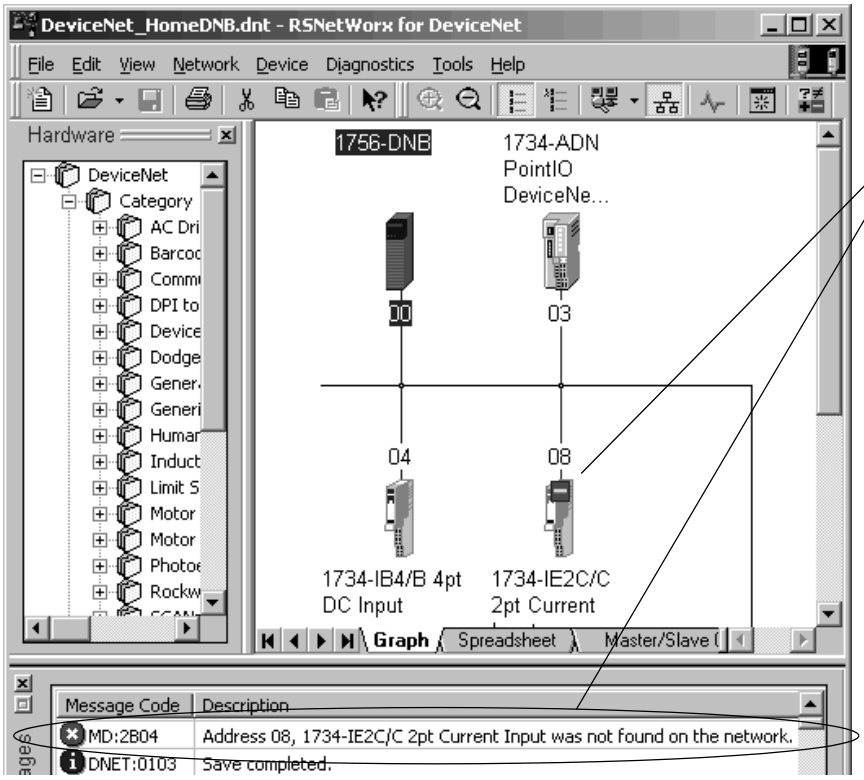
This chapter describes how to reduce the time it takes to replace a failed device.

Topic	Page
Automatic Device Recovery	173
Set Up Automatic Device Recovery	175

Automatic Device Recovery

To reduce system downtime if a device fails, use the automatic device recovery (ADR) option. With ADR, you **do not** have to use any software tools to get a replacement device configured and online.

IMPORTANT Some devices **do not** support ADR.



With ADR, the scanner automatically configures a replacement part. If the address of the device is set via software, the scanner also sets the address of the replacement device.

You configure ADR on a device-by-device basis. You can set up the following ADR settings for each device.

If you want to	And	Then select this ADR option for the device
Automatically configure a replacement device that matches the electronic key of a failed device	Manually change the address of the replacement device	
	Automatically set the address of the replacement device to the default address (63) of the failed device via software	
Manually configure a replacement device	→	

ATTENTION: If a DeviceNet network has more than one scanner, enable Auto-Address Recovery for only one scanner. If more than one scanner is configured for Auto-Address Recovery, there is no way to determine which scanner will recognize a newly-inserted device on the DeviceNet network.

Set Up Automatic Device Recovery

Complete these tasks to set up ADR for a device:

- Choose an Electronic Key Level for a Device
- Update Your Network Configuration File
- Define the Electronic Key
- Enable Auto-Address Recovery for the Scanner
- Set the ADR Settings for the Device
- Download the Changes to the Scanner
- Upload and Save the Configuration File

Choose an Electronic Key Level for a Device

Use the electronic key options to define how closely a replacement device must match a failed device before the scanner applies ADR. The scanner configures/addresses only a device that meets the checkbox items that are checked in the electronic key of the failed device.

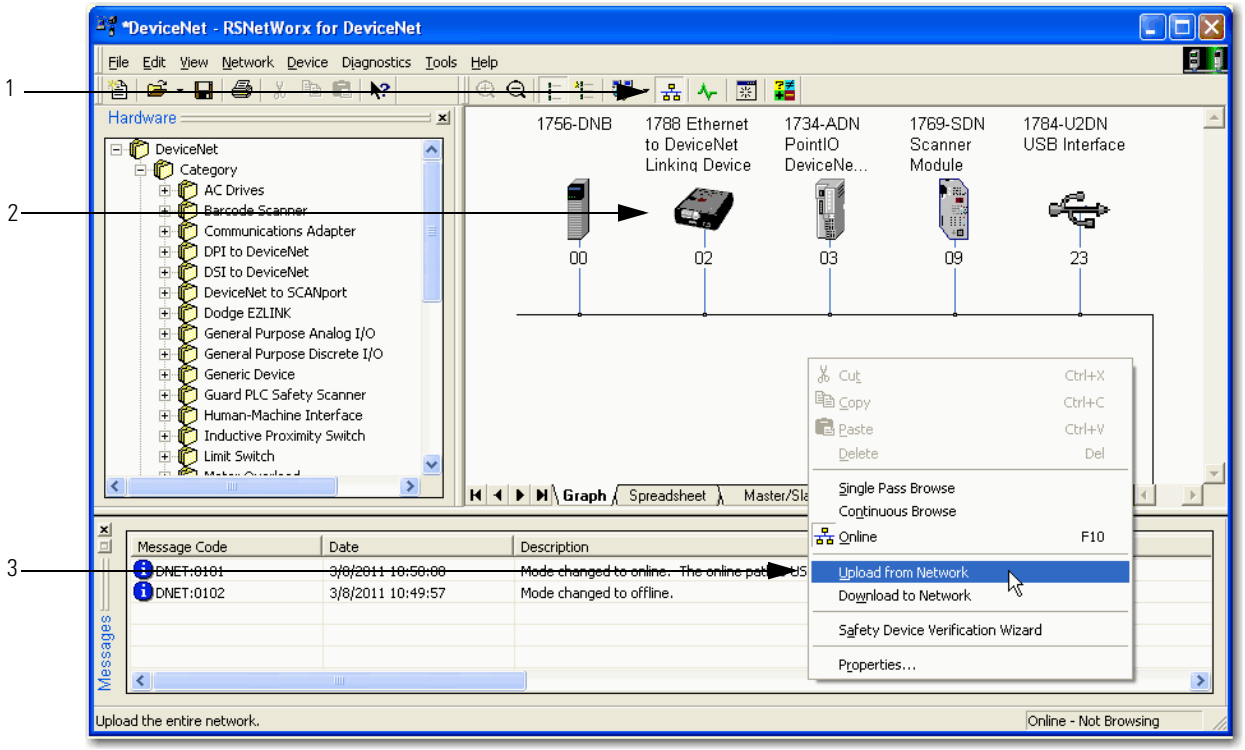
If multiple devices with the same electronic key fail at the same time, the scanner disables auto-address recovery for those devices. This prevents the scanner from changing the address of the wrong device.

Update Your Network Configuration File

When you set up ADR for a device, RSNetWorx for DeviceNet software reads the configuration for the device from the configuration file and stores it in the scanner. Before you set up ADR for a device, make sure the configuration file is up-to-date.

Complete these steps to update the network file.

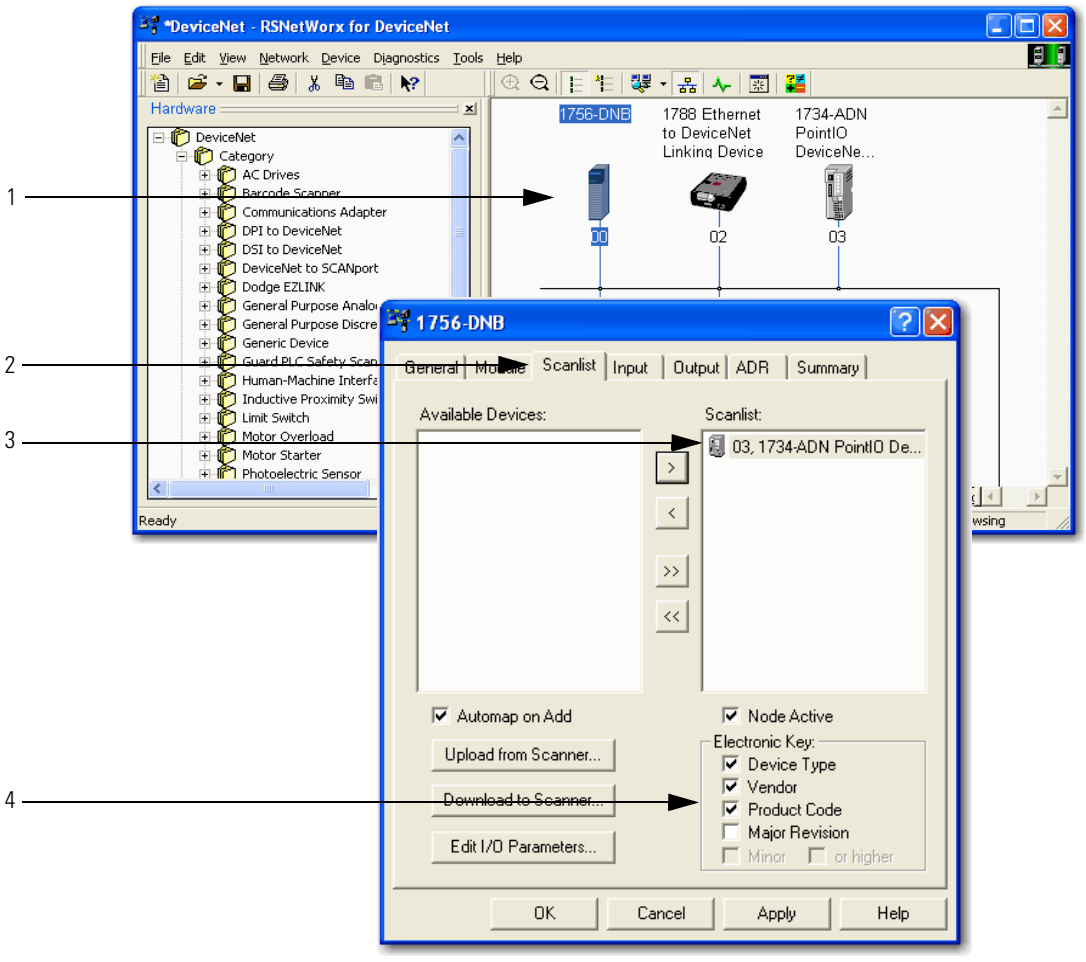
1. Go online.
2. Configure the device.
3. Right-click and upload the entire network.
4. Save the network configuration.



Define the Electronic Key

Complete the following steps to define the electronic key.

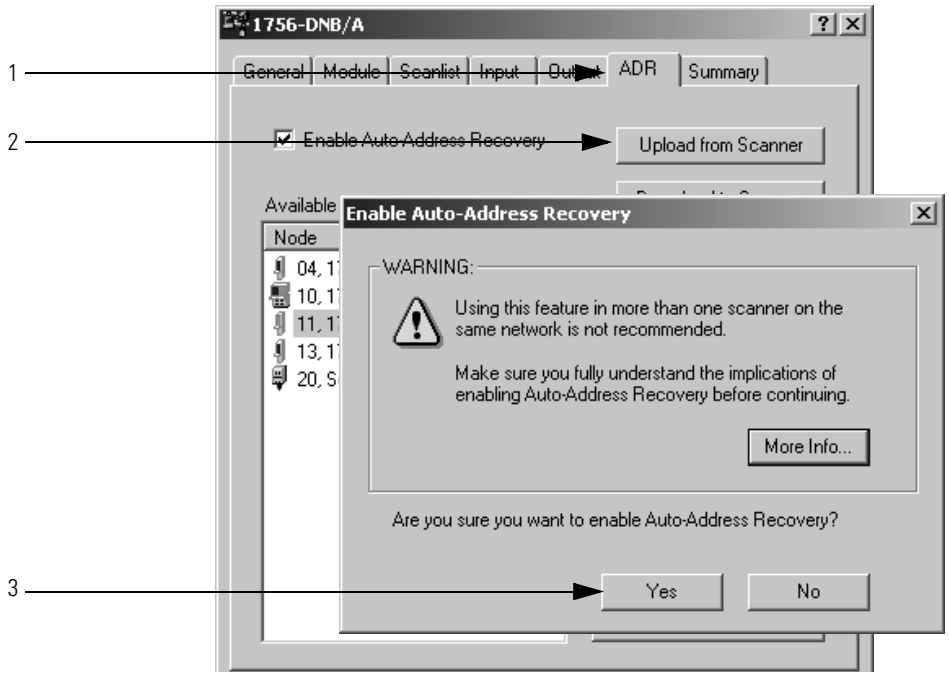
1. Double-click the scanner.
2. Click the Scanlist tab.
3. Select the device.
4. Check the items that must match before a replacement device receives the configuration/address of the selected device.



Enable Auto-Address Recovery for the Scanner

Complete these steps to enable Auto-Address Recovery.

1. Click the ADR tab.
2. Make sure Enable Auto-Address Recovery is checked.
3. When prompted, click Yes to enable Auto-Address Recovery.

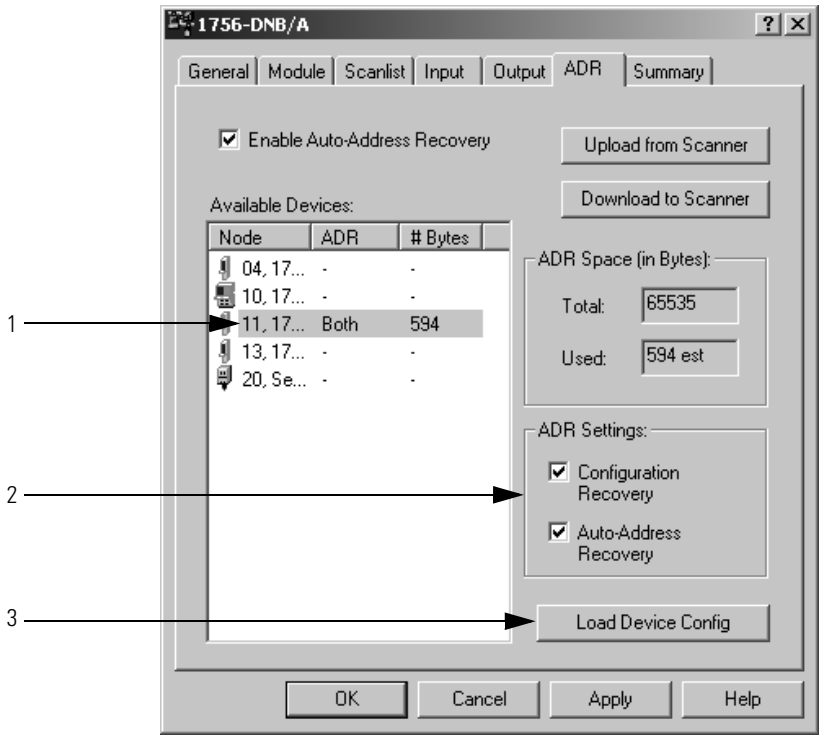


Set the ADR Settings for the Device

Complete these steps to set the ADR settings for the device.

1. Select the device.
2. Select the ADR settings for the device.
3. Read the configuration data of the device into the ADR configuration of the RSNetWorx project.

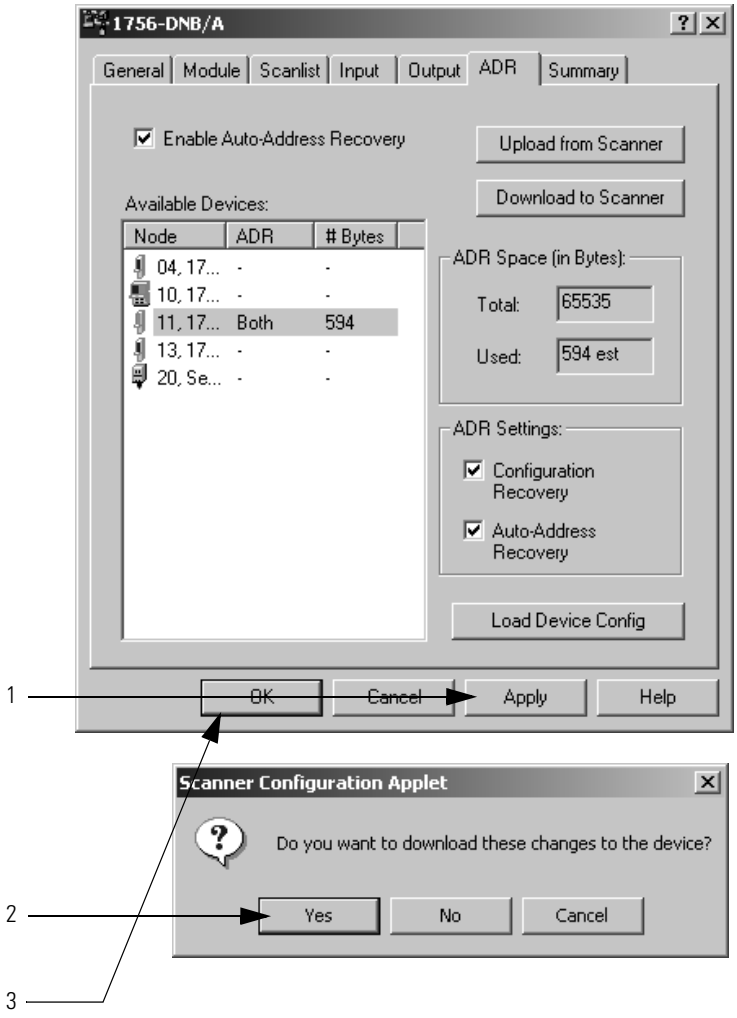
IMPORTANT Make sure you upload all changes made to a device online into the RSNetWorx project before you click the Load Device Config button.



Download the Changes to the Scanner

Complete these steps to download changes to the scanner.

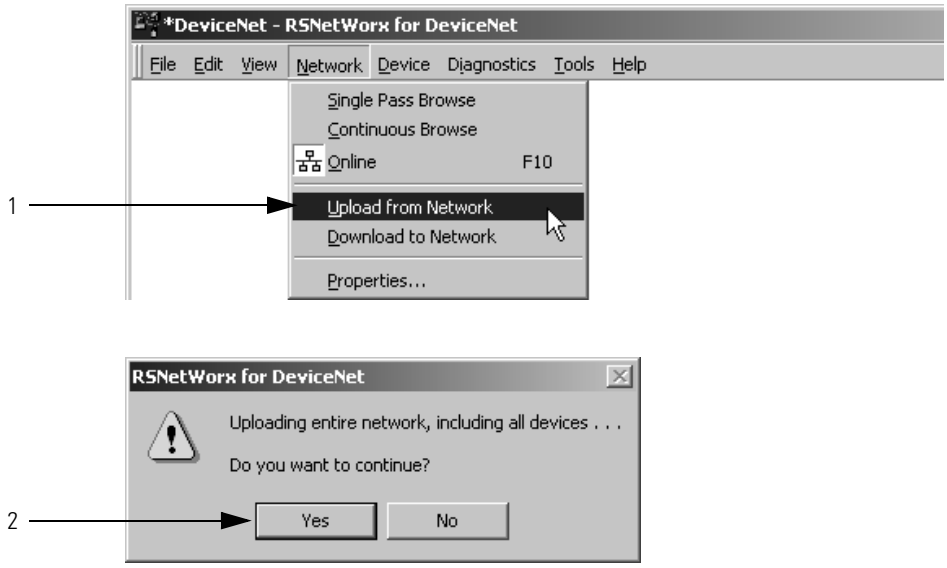
1. Click Apply.
2. When prompted, click Yes to download the changes.
3. Click OK.



Upload and Save the Configuration File

Complete these steps to upload and save the configuration file.

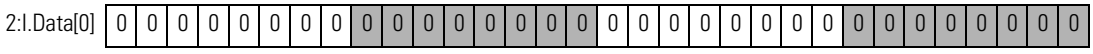
1. Choose Network>Upload from Network.
2. When prompted, click Yes to upload the entire network.
3. Save the file.



Notes:

Map the Memory Location with Advanced Mapping

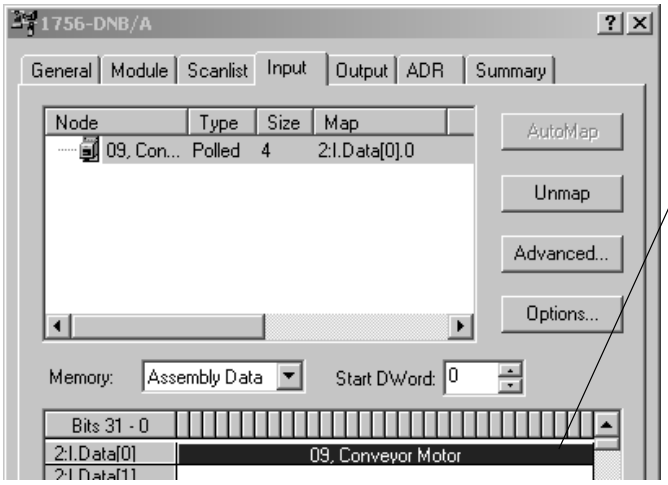
Sometimes, an input or output value for a device may end up encapsulated within a larger tag. For example, a speed value may end up as the upper 16 bits of a DINT element in the scanner. To access the value, you would have to use additional programming.



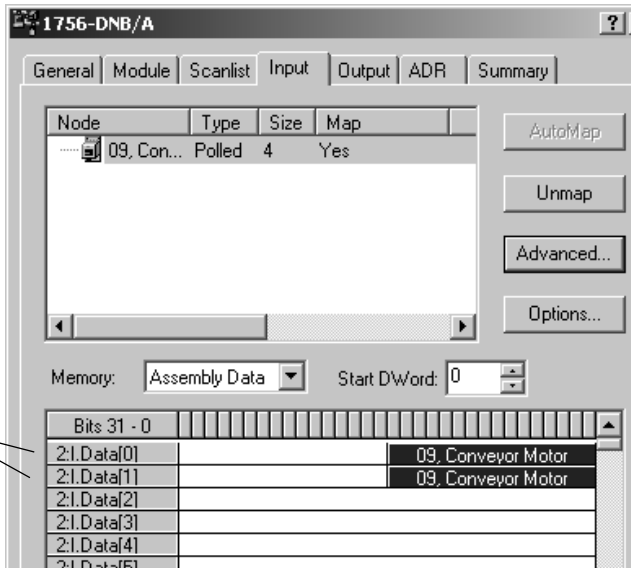
Data map for Bulletin 160 AC drive

Instance 70 Data Format (Basic Speed Control Input Assembly)								
Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0						Running1		Faulted
1								
2	Speed Actual RPM (Low Byte)							
3	Speed Actual RPM (High Byte)							

To make your programming easier, re-map the value to its own tag within the data array of the scanner. This lets you access the value without additional programming.



When you use AutoMap, all of the data for a device ends up packed together.



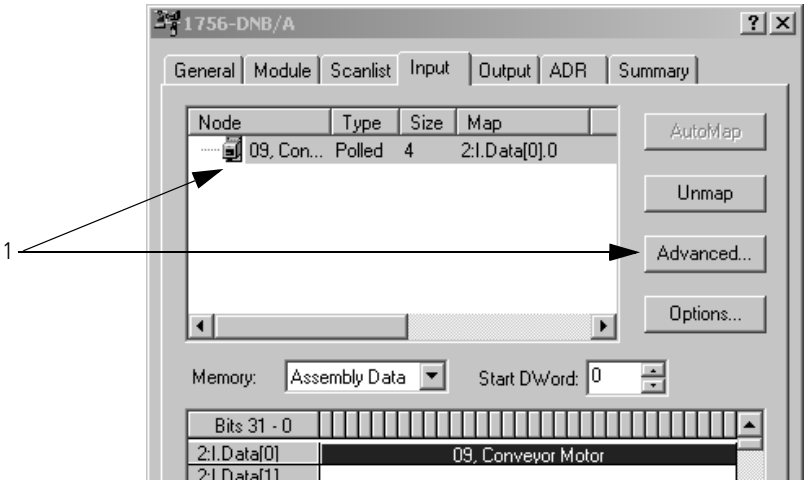
Advanced mapping lets you unpack the data into several map entries. In this example, the upper 16 bits of the original map entry are now in an individual tag.

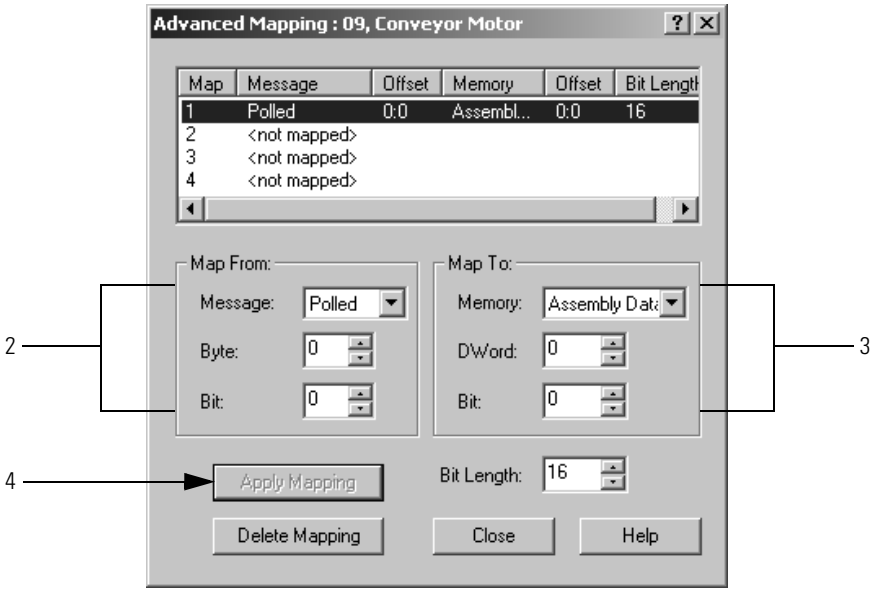
Give a Value Its Own Memory Location

Complete these steps to give a value its own memory location in the input or output memory of the scanner.

1. Select the device and click the Advanced button.
2. For the first map entry, specify the first bit of the data.
   a. Choose a connection type.
   b. Enter the starting byte of the data.
   c. Enter the starting bit of the data.
3. Specify the map location for the data.
   a. Choose the element number in the map.
   b. Enter the starting bit.
   c. Enter the number of bits.

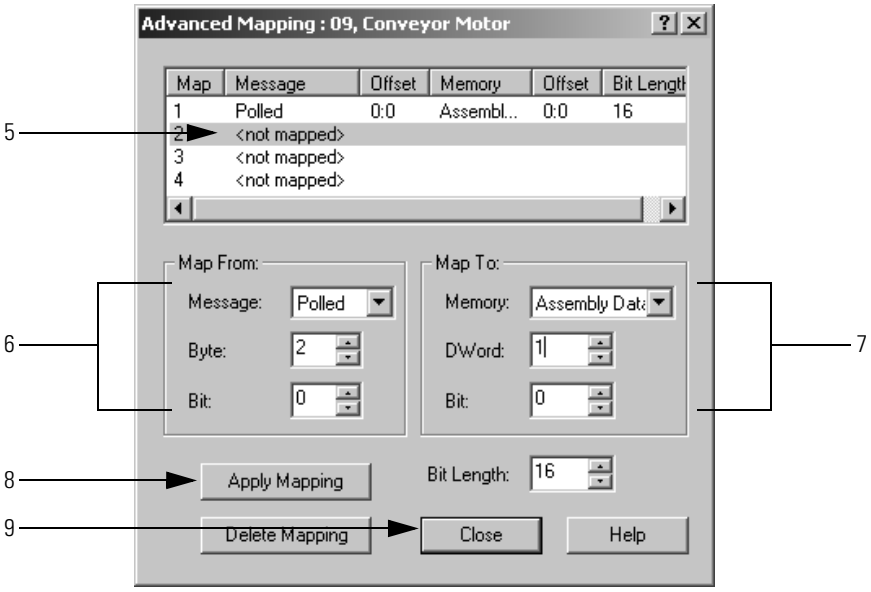
4. Click Apply Mapping.





5. Select the next map number.
6. Specify the first bit of the data for the next map entry for this device.
   a. Choose a connection type.
   b. Enter the starting byte of the data.
   c. Enter the starting bit of the data.
7. Specify the map location for the data.
   a. Choose the element number in the map.
   b. Enter the starting bit.
   c. Enter the number of bits.
8. Click Apply Mapping.

9. Click Close when you are done.



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